THE PERCEPTION OF CONTINGENCY IN DEPRESSED AND NONDEPRESSED SUBJECTS

BY

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Abstract of Dissertation Presented to the Graduate School of the University of Florida in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

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The current research is concerned with the process by which subjects judge whether or not a causal relationship exists between their actions and the occurrence of subsequent outcomes—a judgemental process termed the perception of contingency. In particular, this research attempts to test the theoretical formulations of the learned helplessness model of depression, which suggests that depressed subjects should underestimate the degree of contingency between their responses and subsequent outcomes, relative to nondepressed subjects.

A new methodology for assessing subjects' contingency perception tendencies was developed for this research in order to correct specific difficulties identified in a

critical review of prior assessment procedures. In this methodology, subjects were faced with an ambiguous word association task with the understanding that they would be receiving three different types of feedback regarding their performance on the task: contingent, positive noncontingent, and negative noncontingent. In fact, all feedback was noncontingently administered in accordance with three predetermined reinforcement schedules. At the end of each task, subjects were asked to estimate the degree of contingency that was present in the task using several different rating scales.

Subjects for this research were 40 depressed and 40 nondepressed undergraduate psychology students at the University of Florida who had been identified on the basis of their scores on two different depression inventories administered several weeks apart. The obtained results were in direct opposition to the predictions of the learned helplessness model: Depressed subjects scored in the direction of greater contingency perception, relative to the nondepressed subjects, on all seven contingency perception measures, obtaining significantly higher contingency ratings on four of the seven measures.

These findings were seen to be consistent with more traditional self-blame models of depression and with prior attributional findings indicating that depressed subjects assume more causal responsibility for events occurring in

the world around them than do nondepressed subjects. A number of additional findings relating more generally to the perception of contingency process and to other differences between depressed and nondepressed subjects were also obtained and discussed.

CHAPTER ONE
INTRODUCTION

An extremely important aspect of human psychological functioning is the process by which subjects infer and interpret causality in the world around them. Among the most important of the various types of causal interpretations made by subjects are their judgements as to whether or not a causal relationship exists between their actions and the occurrence of subsequent outcomes: It is at least partially on the basis of such judgements that subjects accept or deny responsibility for events occurring in their environments and assess their potential for exerting personal control over these events. This judgemental process has been termed the perception of contingency.

Overall, the perception of contingency process has received minimal research attention. However, there has been an increased interest in this process during the past few years, generated primarily by the formulations of a theoretical model of depression which suggests that the perception of contingency process may be centrally involved in the etiology of at least some forms of depressive disorder. This theoretical formulation has been termed the

learned helplessness model of depression (Abramson, Seligman, & Teasdale, 1978; Seligman, 1975).

The learned helplessness (LH) model of depression emerged out of a series of animal experiments concerned with the effects of aversive stimulation (See Maier & Seligman, 1976, for a review of this literature). These studies found that subjects receiving noncontingent aversive stimulation subsequently displayed disruptive emotional responding, motivational deficits, and a proactive interference with learning processes relative to controls receiving equal amounts of escapable aversive stimulation. Seligman (1975) hypothesized that these debilitating characteristics, termed the "learned helplessness effect," might result from the animal's having learned that outcomes are independent of its responding. He further suggested parallels between the characteristics of learned helplessness in his laboratory animals and the symptoms of reactive depression in man, arguing that at least some forms of depressive disorder may be associated with the tendency to perceive a lack of contingency between one's responses and subsequent outcomes.

Seligman and his associates (Abramson et al., 1978) have subsequently revised the original LH model by adding an attributional component to the original formulations. Both the original and revised LH models have generated great amounts of empirical research. Although these

studies have generally yielded supportive findings, research in this area has been criticized for its failure to directly address the fundamental components of the model: "Surprisingly, after five years of intensive research on human helplessness, the basic postulates of the theory have not been adequately tested" (Alloy & Abramson, 1980, p. 60). In particular, it appears that it is the central contention regarding the proposed differences in the contingency perception tendencies of depressed and nondepressed subjects that has not been adequately demonstrated.

The current research focuses upon the perception of contingency process and its relationship to depression. The following review of relevant literature in this area will first provide a brief introduction to the concept of contingency and to the contingency perception process; a review of prior research concerning the contingency perception tendencies of depressed and nondepressed subjects will then be presented. This literature review will be followed by a discussion of conceptual and procedural issues relating to the evaluation of subjects' contingency perception tendencies, and, finally, by an introduction to the current research effort.

Review of Relevant Literature

Introduction to the Concept of Contingency and to the Contingency Perception Process

The concept of contingency has been employed in a number of contemporary theories of learning (See Alloy & Abramson, 1979, and Alloy & Seligman, 1979, for a discussion of the development of the contingency concept in learning theory). The concept of contingency that is employed in the LH model is derived from an instrumental learning framework, wherein it refers to the degree of relationship between a subject's response and a subsequent outcome. Although the current research is concerned primarily with subjects' subjective contingency estimates (and particularly with possible biases in these estimates), it is important to understand how the objective degree of contingency between a response and an outcome is conceptualized and quantified.

Seligman, Maier, and Solomon (1971) have suggested that the degree of contingency between a response and a subsequent outcome may be conceptualized in terms of the conjoint variations in two response-outcome probabilities: the conditional probability of the outcome given the presence of the response, $p(O/R)$, and the conditional probability of the outcome given the absence of that response, $p(O/\overline{R})$. A response-outcome relationship is considered

to be fully contingent if, and only if, one of the conditional probabilities is equal to 1.0 and the other is equal to 0.0 (i.e., if $|p(O/R) - p(O/\overline{R})| = 1.0$). A response-outcome relationship is considered to be totally noncontingent if, and only if, the two conditional probabilities are equivalent (i.e., if $|p(O/R) - p(O/\overline{R})| = 0.0$). Intermediate degrees of contingency are indicated when the absolute value of the arithmetic difference between the two probabilities falls between 0.0 and 1.0 (i.e., when $0.0 < |p(O/R) - p(O/\overline{R})| < 1.0$).

It is possible to quantify the objective degree of contingency between a response and an outcome, using the above system, when the two conditional probabilities are known: The degree of contingency is equal to the absolute value of the arithmetic difference between the two probabilities (i.e., the degree of contingency = $|p(O/R) - P(O/\overline{R})|$). For example, if $p(O/R) = .80$ and $p(O/\overline{R}) = .50$, then the degree of contingency is equal to .30. It is important to recognize that response-outcome contingency is independent of overall outcome frequency. For example, there is an equal degree of contingency between a response and an outcome where $p(O/R) = .90$ and $p(O/\overline{R}) = .70$ as there is where $p(O/R) = .30$ and $p(O/\overline{R}) = .10$. Thus, there may be just as much, or as little, contingency present when a subject obtains a specific outcome on 90% of the trials as there is when he receives it on 30%, depending upon the specific conditional probabilities involved.

In spite of the fact that a number of research efforts have examined the subjective contingency judgements of depressed and nondepressed subjects (this research is reviewed below), it is only within the past two years that a theoretical model of the contingency perception process has been set forth. Crocker (1981) has proposed that the process by which subjects make covariation judgements, such as that employed in the perception of contingency, is not a unitary one, but one that is composed of several more or less clearly defined stages or steps. In step one of her model, subjects must determine what data are relevant to the covariation judgement, and then, in step two, the relevant populations must be sampled. In step three, subjects must assign values to the variables of interest and classify them as either confirming or disconfirming cases (i.e., as either indicative or contraindicative of a contingent relationship). In step four, subjects must recall the evidence and estimate the frequencies of confirming and disconfirming feedback. Finally, in step five, subjects must integrate the evidence to obtain some overall conclusion regarding the degree of covariation in the observed instances. Crocker also suggests that biases and distortions may enter the contingency judgement process at any one, or all, of these judgemental steps.

Although Crocker's model remains essentially untested at the present time, it is an intuitively appealing model which does provide some conceptual framework for discussing the perception of contingency process. Some of the research findings reviewed below, as well as some of the findings from the current research, will be discussed in relation to this model of the contingency judgement process.

The Perception of Contingency in Nondepressed Subjects

The first area of research to be reviewed here involves a number of findings which suggest that subjects are generally insensitive to the distinction between contingent and noncontingent events (this area of research is concerned with the perception of event-event relationships, not specifically with response-outcome relationships). Hake and Hyman (1953), for example, presented subjects with either a randomly or probabilistically determined series of binary events, asking subjects to predict, on a trial-by-trial basis, what the next event would be. Many of the subjects were found to perceive the random pattern as probabilistically determined. Similarly, Smedslund (1963) had subjects examine a number of cards, each of which indicated either the presence or absence of a symptom and/or a disease. Subjects were found to erroneously deduce that there was a consistent relationship between the symptoms and diseases when, in fact, there was none. It appeared to Smedslund that subjects' erroneous

judgements resulted from their tendency to focus upon the positive instances of co-occurrence of symptom and disease, and by ignoring negative instances. Thus, these findings indicate that subjects tend to perceive contingent relationships between events even when these events are noncontingently related. This finding suggests that subjects may also tend to erroneously perceive contingency between their responses and subsequent outcomes under noncontingent conditions.

A number of studies have yielded findings which may be interpreted to indicate that subjects do tend to perceive contingent relationships between their responses and subsequent outcomes under noncontingent conditions. In concept identification experiments, for example, subjects have commonly been found not to recognize when positive feedback is being received noncontingently; instead, they have tended to report complex deterministic rules that they feel govern their reinforcement (e.g., Levine, 1971). Similarly, laboratory studies of "superstitious" responding in humans (e.g., Bruner & Revusky, 1961; Wright, 1962) have found that subjects typically develop complex patterns of responding when faced with noncontingent feedback, presumably reflecting their beliefs that these outcomes are determined by their responses. Thus, there are a number of findings which suggest that subjects may be relatively insensitive to the presence of noncontingent relationships,

displaying, instead, a bias toward the perception of contingent relationships between their responses and subsequent outcomes.

In a related area of research, Langer (1975, 1978) has noted that subjects frequently behave as if they can control chance events (e.g., in gambling and in games of chance). She has referred to this phenomenon as the "illusion of control." The findings reviewed above may be seen to represent such an illusion of control: The subjects in these studies have behaved as if they could control the noncontingent outcomes they received. Langer (1978) has discussed a number of general factors which may help to explain why subjects make such judgemental errors: "(1) persons are positively motivated to master their environment; (2) persons are motivated to avoid the negative consequences of having no control; (3) persons may fail to make the distinction between skill and chance elements because of their simultaneous presence in most events; and (4) it may be strategically efficacious for persons to treat all events as controllable" (pp. 186-187).

Thus, Langer suggests that subjects may be broadly biased toward the perception of contingency and control in regard to the outcomes that they receive. However, she has also presented a theory about the illusion of control which suggests that specific environmental factors may facilitate such biased perceptions: "The theory states

that those conditions that allow or encourage participants to behave as if they are participating in a skill event, induce an illusion of control" (pp. 200-201). In this regard, it might be suggested that the findings reported above, indicating that subjects are biased to perceive contingency between their responses and subsequent outcomes, may be at least partially reflective of demand characteristics in the experimental settings which suggest to subjects that they are participating in skill events. Thus, it may be that subjects would not evidence such a bias under conditions where contingency is not implied by the characteristics of their environment.

Some support for the above suggestion has been obtained by Peterson (1980) who was particularly concerned with the above findings regarding subjects' apparent tendency to misperceive contingency between noncontingent events (these findings do not directly concern subjects' perceptions of response-outcome relationships). He suggested that the subjects participating in these experimental studies may have failed to consider the hypothesis that events are randomly associated because of their assumptions and expectations regarding such studies. In order to test this suggestion, Peterson had subjects describe two series of binary events, one random and one patterned. He found that subjects correctly identified the random sequence only when the use of randomness had

been legitimized, either directly (through instructions) or indirectly (through experience with a prior comparison sequence). Thus, it appears that subjects' observed tendency to perceive contingent relationships between unrelated events may be at least partially accounted for by the demand characteristics of the experimental setting. Similarly, it appears that these characteristics might also partially account for the findings that subjects tend to perceive contingency between their own responses and subsequent outcomes.

Jenkins and Ward (1965) conducted a much more extensive examination of the contingency perception process than did the above studies. They presented subjects with a series of differing contingency judgement problems under a variety of instructional and procedural conditions. For each problem, subjects were presented with 60 trials of a task in which their choice between two responses (pressing either of two buttons) was followed by one of two possible outcomes (illumination of one of two feedback lights) on each trial. Subjects' responses were contingently related to the outcomes to varying degrees in some problems (i.e., to varying degrees, pressing one button would result in a particular outcome more frequently than would pressing the other button), and noncontingently related in others (i.e., the outcomes were equally likely to occur given either of the two responses). The problems differed not only in

the degree of contingency that was present, but also in the overall frequency that the outcomes occurred (e.g., some problems involved the same degree of contingency but differed in outcome frequency). Under one instructional condition, subjects were directed to obtain a particular outcome as often as possible (Score condition), whereas in another they were directed to learn to produce either outcome at will (Control condition). Subjects were also involved in the tasks either as active participants (i.e., actually choosing which button to press on each trial) or as spectators (i.e., observing others' responses on the tasks and the resulting outcomes). Also, the instructions for all subjects specifically indicated that events might be unrelated to their responding during these problems.

At the end of each problem subjects were asked to "make a judgement of the degree of control which had been exerted over the outcomes by response choices" (Jenkins & Ward, 1965, p. 6). The researchers explained that the term "control" was substituted for that of "contingency" in their instructions to subjects and in their rating scale "because in the context of the task it seemed to be the most natural way to communicate the technical meaning of contingency with everyday language" (p. 2). (It will be argued later that the terms "contingency" and "control" do not convey the same meaning.) They found that subjects' ratings on the judgement of control scale did not correspond

at all to the objective contingencies in the problems. More specifically, they found that subjects' ratings on this scale were highly correlated with the number of successful trials they received on the tasks (i.e., with the number of trials on which they actually received the outcome they attempted to obtain). Jenkins and Ward concluded from these findings that subjects lack a "statistical concept of contingency" and that they "do not distinguish the ability to manipulate outcomes from their ability to predict them" (p. 17).

Thus, while the first set of findings reviewed above suggested that subjects may be broadly biased toward the perception of contingency, and away from the perception of noncontingency, Jenkins and Ward's findings suggest that this type of bias may operate only under conditions in which subjects receive large numbers of desired outcomes. Further, these findings suggest that subjects may actually tend to underestimate the degree of contingency between their responses and subsequent outcomes under conditions in which they they receive desired outcomes infrequently. The discrepancy between these two sets of findings may be related to the fact that the Jenkins and Ward procedure legitimized the perception of noncontingency and/or to the fact that the earlier studies did not examine conditions in which subjects strived for, but were unable to obtain, desired outcomes (most of the earlier research was concerned

either with event-event relationships or with response-outcome relationships under positive reinforcement conditions).

The findings of Jenkins and Ward (1965) have been largely supported by another, more recent, examination of the contingency perception process. Alloy and Abramson (1979) conducted a series of experiments specifically for the purpose of contrasting the contingency perception tendencies of depressed and nondepressed subjects (the findings relating to the depressed subjects will be reviewed at a later point). In their procedures, subjects were faced with one of several contingency judgement problems which were similar to those employed by Jenkins and Ward: Subjects were directed to assess the degree of relationship between a single response choice (pressing versus not pressing a button) and the occurrence or nonoccurrence of a single outcome (onset of a green light). The major dependent measure consisted of subjects' ratings on a judgement of control scale which was also similar to that employed by Jenkins and Ward. Also as in the Jenkins and Ward procedure, subjects were specifically instructed that the outcomes in the problems might be unrelated to their responses.

In Alloy and Abramson's (1979) Experiment I, subjects were presented with problems in which the degree of contingency between their responses and green light onset was .25, .50, or .75. The problems were counterbalanced

so as to control for whether pressing or not pressing resulted in the higher percentage of green light onset, and the problems were selected in such a way that the overall percentage of green light onset was negatively correlated with the degree of contingency in the problems (e.g., the response-outcome probabilities were such that the green light occurred more often in the .25 condition than in the .75 condition). The latter characteristic was included to offset the relationship noted in the Jenkins and Ward (1965) study between the frequency of the desired outcome and subjects' judgements of contingency.

Alloy and Abramson (1979) found, in their first experiment, that there was a close correspondence between subjects' ratings on the judgement of control scales and the objective contingencies present in the problems, and that these ratings did not correlate with the frequency of green light onset. They noted that these findings seemed quite discrepant from those of Jenkins and Ward, and they suggested that these differences might relate to differences in the operationalization of the contingency concept in the two studies (viz., that the Jenkins and Ward procedure examined the relationships between two responses and two outcomes, whereas their own study examined the relationship between the presence or absence of a single response and the occurrence or nonoccurrence of a single outcome). However, it appears that the findings of the

two studies may not be as discrepant as they initially appear. It must be recalled that Jenkins and Ward employed a variety of contingency judgement problems under several different instructional and procedural conditions; thus, the Alloy and Abramson findings may relate to only a specific subset of the Jenkins and Ward findings. When one examines only the one condition of the Jenkins and Ward study that most closely parallels the Alloy and Abramson procedure (the contingent problem, active subject, control instruction condition), it is seen that these subjects were also quite accurate in their contingency assessments (estimates of 35.5% and 61.2% for conditions where the objective degrees of contingency were .30 and .60, respectively).

Thus, there appears to be some consistent evidence to indicate that subjects may accurately perceive contingency under certain types of conditions. An examination of the conditions under which subjects' ratings did parallel objective contingencies in the two studies suggests that there are two factors which may influence the accuracy of subjects' ratings: the actual degree of contingency present in the problem, and subjects' instructions regarding their task in relation to the problems. Subjects' ratings appear to be least likely to parallel objective contingencies when they are faced with objectively noncontingent outcomes and/or they are specifically directed to obtain particular outcomes (as in Jenkins and Ward's Score

condition). Alloy and Abramson (1979) have commented on this first factor, suggesting that "noncontingency is a psychologically more difficult relationship to perceive or understand than is contingency" (p. 474). The significance of the second factor will be discussed at a later point.

In their Experiment II, Alloy and Abramson asked subjects to judge the degree of contingency present in one of two problems in which responses and outcomes were noncontingently related. In one of the problems the green light occurred noncontingently on 75% of the trials; it occurred on only 25% of the trials in the second problem. The results indicated that all subjects accurately detected the noncontingency in the 25% reinforcement condition, whereas the nondepressed subjects gave high ratings on the judgement of control scale in the 75% reinforcement condition. Thus, it appears that the nondepressed subjects displayed an illusion of control over the positive outcomes in the 75% condition, but that they accurately detected the noncontingency in the 25% condition. This pattern of results is consistent with the overall pattern obtained by Jenkins and Ward (1965): It suggests that nondepressed subjects' contingency judgements are closely tied to reinforcement frequency.

The finding that nondepressed subjects' judgements of control did not correspond to objective contingencies in

this experiment, but that they did in Experiment I, supports Alloy and Abramson's (1979) suggestion that noncontingency may be a particularly difficult concept for subjects to understand (at least for nondepressed subjects). Alternately, however, it appears that nondepressed subjects' judgement of control ratings in this second experiment may not have been actually reflective of their contingency perception tendencies. In particular, it appears that these subjects may not have interpreted this task in the manner intended by the experimenters. In this regard, it may be noted that a number of subjects, particularly nondepressed subjects, reported attempting complex hypotheses on this task (e.g., pressing every other time, pressing early or late in the response period, etc.)—this was not reported in regard to Experiment I. This finding seems to indicate that these subjects did not interpret their tasks in the manner intended by the experimenters, since they should have been concerned only with the relationship between the two identified response choices (press or not press) and the occurrence of the outcomes if they had interpreted them correctly. This apparent misinterpretation of the task by the nondepressed subjects seems to indicate that these subjects were not involved simply in the assessment of the response-outcome relationships in the problems, but, rather, that they were involved in efforts to exert control over the outcomes in the task. The

suggestion that nondepressed subjects may have misinterpreted their task in this experiment will be considered in more detail at a later point.

In Experiments III and IV, Alloy and Abramson attempted to examine subjects' contingency judgements under conditions which more closely paralleled real life, in that they required subjects to make contingency judgements while actively striving to obtain particular outcomes. In order to accomplish this, subjects were assigned to either a "win" or a "lose" condition. In the win condition, subjects started the task with no money, but they were instructed that they could win money by making the green light come on during the experiment; subjects in the lose condition were given money at the outset of the experiment, but they were told that they would lose money every time the green light failed to come on. In Experiment III, the occurrence of the green light was noncontingently related to subjects' responding and set to occur on 50% of the trials. In Experiment IV, the onset of the green light was contingently related to subjects' responding at the .50 level of contingency. Thus, in these experiments, Alloy and Abramson were not concerned with reinforcement frequency, but, rather, with outcome valence: Although subjects in the two conditions received essentially equal amounts of positive versus negative feedback, the valence of the outcomes differed as a result of the procedural differences in the conditions.

The results for Experiments III and IV indicated that nondepressed subjects gave significantly higher ratings on the judgement of control scales in the win condition than in the lose condition for both the contingent and noncontingent problems. Their ratings accurately corresponded with the objective degree of contingency only in the lose condition of the noncontingent problem, where their ratings accurately reflected the noncontingent nature of the feedback they received. Otherwise, they underestimated the objective degree of contingency in the lose condition and overestimated it in the win condition. These findings seem quite consistent with the earlier findings indicating that nondepressed subjects' contingency perceptions are closely tied to reinforcement frequency: Both sets of findings indicate that nondepressed subjects tend to perceive contingency in a self-serving manner, overestimating contingency under positive conditions (high reinforcement frequency and/or positively valenced feedback) and underestimating contingency under negative conditions (low reinforcement frequency and/or negatively valenced feedback). It may be noted, however, that almost all of the subjects in Experiment III reported attempting complex hypotheses on the problems (the number of complex hypotheses attempted in Experiment IV was not reported). As noted above, this finding may be seen to indicate that these subjects may not have interpreted their tasks in the manner intended by the

experimenters, and, therefore, that the obtained results may not actually be reflective of subjects' contingency perception tendencies (Again, this suggestion will be discussed in more detail at a later point).

In summary, prior research has yielded two distinguishable proposals regarding the contingency perception tendencies of nondepressed subjects. The early research reviewed above suggested that these subjects might be broadly biased toward the perception of contingent relationships and away from the perception of noncontingency. However, it was noted that these findings were based upon examinations of only limited aspects of the contingency judgement process, and that they might also be reflective of demand characteristics in the experimental settings which encouraged subjects to interpret noncontingent events as being contingently determined. More recent examinations of the contingency judgement process, which have been more comprehensive and have lacked the overt demand characteristics referred to above, have indicated that while subjects may accurately perceive contingency under some limited conditions, they typically perceive contingency in a self-serving manner, tending to overestimate contingency under positive conditions and underestimate it under negative conditions.

The suggestion that nondepressed subjects may display a self-serving bias in their contingency perceptions is

consistent with a growing body of research findings which indicate that nondepressed subjects frequently display self-serving biases in their interpretations of events, presumably relating to their efforts to protect and/or enhance self-esteem. For example, a large body of research has indicated that subjects typically make causal interpretations in a self-serving manner, tending to attribute positive outcomes to internal factors and negative outcomes to external factors (See Miller & Ross, 1975, and Bradley, 1978, for reviews of this research). Similarly, nondepressed subjects have been found to underestimate the amount of negative feedback they receive on performance tasks (e.g., Nelson & Craighead, 1977), and to exaggerate their level of social competence relative to the judgements of other people (Lewinsohn, Mischel, Chaplain, & Barton, 1980). Thus, there are a number of findings which indicate that nondepressed subjects frequently employ self-serving biases in their interpretations of events, and the findings reviewed above suggest that such biases may also be involved in their perception of response-outcome relationships.

The Perception of Contingency in Depressed Subjects

It was noted earlier that while the LH model has generated great amounts of empirical research, few studies have attempted to directly test the fundamental prediction

of the model: that depressed subjects should underestimate contingency relative to nondepressed subjects. Miller and Seligman (1973) were the first to attempt to develop a methodology for contrasting the contingency perception tendencies of depressed and nondepressed subjects. They developed an expectancy-change procedure which was derived from a methodology employed in early research work concerning Rotter's (1966) locus of control construct. Rotter and his associates (e.g., Rotter, Liverant, & Crowne, 1961) engaged subjects in tasks in which success appeared to be determined either by chance (i.e., noncontingently) or skill (i.e., contingently). They, then, had subjects verbalize their expectations for future success on a trial-by-trial basis as they progressed through the task. They found that subjects' verbalized expectancies for future successes on the tasks were related to the interaction between the outcomes they received and the skill-chance nature of the task. In particular, they found that outcomes of previous trials had a greater impact upon subjects' expectancies for future successes when they believed the outcomes were skill determined (contingent) than when they believed the outcomes were chance determined (noncontingent). Thus, Miller and Seligman reasoned that subjects tending to perceive outcomes as noncontingently determined, as depressed subjects are hypothesized to do by the LH model, should exhibit smaller expectancy changes when

faced with ostensibly skill tasks than should those subjects who are more prone to perceive contingency between their responses and subsequent outcomes—no differences are predicted for the expectancy changes of the two groups in the chance condition, since all subjects should tend to perceive noncontingency in this condition.

Miller and Seligman's (1973) results were supportive of the LH model: Depressed subjects were found to display smaller expectancy changes for skill, but not for chance, tasks relative to the nondepressed subjects. These findings have generally been supported in a number of additional studies which have employed a similar methodology (e.g., Klein & Seligman, 1976; Miller, Seligman, & Kurlander, 1975). However, the expectancy-change methodology has been seriously questioned on a number of grounds. First, Dweck and Gilliard (1975) have found that trial-by-trial expectancy ratings are quite intrusive, suggesting that the findings obtained from such measures must be interpreted with extreme caution. Second, Alloy and Seligman (1979) have suggested that these judgements may relate more to subjects' expectational biases regarding their potential for future control than to biases in their perceptions regarding the contingency of feedback they have actually received. Third, attributional theorists (e.g., Weiner, Nierenberg, & Goldstein, 1976) have suggested that expectancy changes of the sort involved in these studies

are primarily reflective of subjects' judgements regarding the stability of the perceived causal factors relating to the outcomes. Thus, the smaller expectancy changes of the depressed subjects may reflect differences in the extent to which they attributed the outcomes to stable factors rather than reflecting a tendency to underestimate contingency. On the basis of the alternate explanations of the expectancy-change results presented above, Seligman and his associates (Abramson et al., 1978; Alloy & Abramson, 1979) have concluded that the expectancy-change procedure cannot be assumed to accurately assess subjects' contingency perception tendencies.

As already noted above, Alloy and Abramson (1979) employed a procedure similar to that of Jenkins and Ward (1965) for contrasting the contingency perception tendencies of depressed and nondepressed subjects. In their Experiment I, it may be recalled that subjects were faced with one of three contingency judgement problems in which the objective degree of contingency was either .25, .50, or .75. It was also noted that the judgement of control ratings of both depressed and nondepressed subjects were highly correlated with the objective degree of contingency in the problems. Depressed and nondepressed subjects' judgements were found not to differ at all in this experiment. This finding is clearly in opposition to the basic prediction of the LH model which suggests that depressed subjects should underestimate contingency.

In Experiment II, Alloy and Abramson's subjects were faced with problems in which their responses were unrelated to the outcomes they received (i.e., they were objectively noncontingent). In one problem, green light onset occurred noncontingently on 25% of the trials; in the other condition it occurred noncontingently on 75% of the trials. The depressed subjects' judgement of control ratings accurately reflected the noncontingent nature of the feedback under both conditions, whereas, it may be recalled, nondepressed subjects' ratings indicated that there was a significantly greater degree of contingency present in the 75% reinforcement condition. These findings can be interpreted to provide partial support for the LH model in that they suggest that depressed subjects may be more sensitive to the presence of noncontingent relationships, particularly when receiving high-frequency noncontingent positive feedback. However, this finding can also be interpreted to indicate that depressed subjects are simply more accurate in their contingency perceptions than are nondepressed subjects. It may be noted, in this regard, that depressed subjects' judgement of control ratings were uncorrelated with the judged amount of reinforcement received, unlike those of nondepressed subjects which were highly correlated. This finding suggests that the depressed subjects' judgements were not influenced by reinforcement frequency, whereas nondepressed subjects' judgements were.

In their final two experiments, Alloy and Abramson (1979) attempted to make their experimental task more like those faced by subjects in the real world, in that they required that subjects make contingency judgements while attempting to obtain particular outcomes. As noted earlier, subjects in the win condition gained money each time the green light came on, whereas subjects in the lose condition lost money each time the green light failed to come on. In Experiment III, the occurrence of the green light was unrelated to subjects' responding; in Experiment IV, the onset of the light was contingently related to subjects' responding at the .50 level of contingency. The results for both experiments indicated that the depressed subjects' judgements corresponded closely to the objective degree of contingency in the problems, and that they did not differ in the win and lose conditions. These findings support the suggestion made above that depressed subjects may be more accurate in their perceptions of contingency than are nondepressed subjects.

Alloy and Abramson (1979) conclude on the basis of their four experiments that "depressed people are 'sadder but wiser' than nondepressed people" (p. 479) in their judgements of contingency: They note that the depressed subjects were quite accurate in their contingency judgements throughout these experiments and that they did not evidence the self-serving biases displayed by nondepressed

subjects. This pattern of results is not consistent with the predictions of the LH model, although it is consistent with a growing body of research findings which indicate that depressed subjects do not display self-protective biases commonly shown by nondepressed subjects, presumably because the depressed subjects are less motivated to protect and/or maintain self-esteem. For example, several studies have indicated that depressed subjects do not display the illusion of control over chance events commonly observed among nondepressed subjects (Alloy & Abramson, 1982; Golin, Terrell, & Johnson, 1977; Golin, Terrell, Weitz, & Drost, 1979). Depressed subjects have also been found not to display self-serving attributional biases, tending instead to attribute positive and negative outcomes in a similar manner (e.g., Kuiper, 1978; Rizley, 1978). Finally, depressed subjects have also been found to be more accurate in their recall of performance feedback (Nelson & Craighead, 1977) and in their assessment of their social competence (Lewinsohn, Mischel, Chaplain, & Barton, 1980) than are nondepressed subjects who tend to distort these judgements in a positive direction. The degree of consistency between the above findings and the pattern of results reported by Alloy and Abramson (1979) provides general support for the suggestion that depressed subjects may be more accurate in their perceptions of contingency than are nondepressed subjects.

One additional study has attempted to contrast the contingency perception tendencies of depressed and nondepressed subjects. Miller (Note 1) exposed depressed and nondepressed subjects to an ambiguous word association task with the instructions that the feedback they received regarding their performance would initially be contingent upon their responding, but that at some point during the course of the task they would begin to receive failure feedback on some trials regardless of their responses—i.e., the feedback would become noncontingent. In fact, feedback was administered noncontingently for all trials of the task in a predetermined sequence such that the frequency of negative outcomes was initially quite low, but gradually increased as subjects progressed through the task. Subjects were directed to identify the point in the task when they perceived that they began to receive the noncontingent negative feedback by pressing a "stop" button on their control panel. It was assumed that stopping earlier on the task would be associated with a greater tendency to perceive outcomes as being noncontingently determined.

Miller found that depressed subjects exhibited a marginally significant tendency to stop earlier on the task (i.e., to perceive noncontingency earlier) than did the nondepressed group. A high-depressed sub-group was found to stop significantly earlier than did the nondepressed subjects. Thus, Miller's findings do provide some support

for the basic prediction of the LH model (i.e., that depressed subjects tend to underestimate contingency relative to nondepressed subjects). However, there are methodological issues which require that these findings be regarded with caution. First, he found statistically significant differences only between the nondepressed group and the high-depressed sub-group which was identified on a post-hoc basis. Second, there was a confound in Miller's procedure between the perception of noncontingency and stopping earlier on the task. This raises the possibility that depressed subjects may have stopped earlier on the task, not because they were more prone to perceive noncontingency, but because they were less motivated and involved in the task than were the nondepressed subjects. It may also be noted that Miller's study examined subjects' contingency perception tendencies only for negative outcomes—it may also be important to examine subjects' contingency perception tendencies for positive events.

In summary, the above research has provided little, if any, support for the LH model. Although the findings from the expectancy-change research and from Miller's methodology have supported the LH prediction that depressed subjects should underestimate contingency relative to nondepressed subjects, methodological considerations demand that these findings be considered with caution. The findings obtained from Alloy and Abramson's (1979) research have

provided no support for the LH model: They suggest that depressed subjects are quite accurate in their contingency judgements and that they do not evidence any consistent tendency to underestimate contingency relative to the non-depressed subjects.

Discussion of Issues Relating to the Assessment of Subjects' Contingency Perception Tendencies

A critical evaluation of the research reviewed above raises two major issues regarding the manner in which the contingency perception process has been conceptualized and assessed in these studies. First, it appears that most of the research in this area has seriously confounded the concepts of contingency and control in their experimental procedures and assessment instruments, making it difficult to determine if their findings actually reflect differences in subjects' contingency perception tendencies or whether they are more reflective of subjects' judgements regarding their capacity to exert personal control over the outcomes they received in these tasks. Second, it appears that these studies have focused, almost exclusively, upon a limited aspect of the contingency perception process, and largely ignored other, potentially more significant aspects of this process. Each of these issues will be discussed in more detail below.

It may be recalled that the term "control" was substituted for that of "contingency" in the experimental

instructions and assessment instruments employed in the two major studies of subjects' contingency perception tendencies (Alloy & Abramson, 1979, and Jenkins & Ward, 1965). This substitution was based upon the assumption that the two terms convey equivalent meanings. This assumption does not appear to be correct. The concept of contingency was defined earlier in terms of the degree of relationship between a subject's response and a subsequent outcome. In contrast, the concept of control may best be defined in terms of a subject's capacity to selectively influence outcomes in a desired direction. Although there does seem to be some degree of overlap between these two concepts, they do not appear to be equivalent: The presence of a contingent relationship between a response and an outcome appears to be a necessary, but not sufficient, condition for the exercise of control over that outcome. This conceptual distinction suggests that while a subject's judgement of his capacity to control an outcome may be at least partially reflective of his perception of the degree of contingency that is involved, it appears that other factors would also influence this judgement.

The distinctions made above between the concepts of contingency and control may be made clearer through the use of an illustration. Assume, for example, that a fully contingent relationship exists between response A and outcome B—i.e., proper execution of A by the subject will

reliably result in the occurrence of outcome B. The presence of the contingent relationship between A and B indicates that the subject has the potential to exercise full control over the occurrence of outcome B, providing that he is fully able to identify and properly execute response A. If, however, the subject is unable, for some reason, to identify and/or properly execute response A, then he will be unable to exert control over the occurrence of B in spite of the contingent relationship between A and B. This illustration demonstrates at least one hypothetical condition in which subjects' perceptions of contingency and their judgements of control might be expected to be incongruent: The subject who receives undesired feedback in spite of a clearly contingent relationship may be expected to develop low judgements of control, but to maintain high perceptions of contingency.

The distinctions made in the foregoing example parallel those made by Bandura (1977) between response-outcome expectancies and feelings of self-efficacy. Subjects' response-outcome expectancies are their beliefs that a particular outcome will follow a given response if it is executed. In the above example, this corresponds with subjects' perception of the degree of contingency between A and B. Subjects' feelings of self-efficacy relate to their beliefs that they will be able to identify and execute the response necessary to obtain the desired outcome if

a contingent relationship exists. In the above example, this corresponds with subjects' beliefs that they will be able to identify and properly execute response A. Thus, subjects' judgements of their potential for control over an outcome may be seen to represent some combination of their perception of the degree of contingency that is present and their judgement as to their degree of efficacy in identifying and executing the necessary controlling response.

Reconsideration of the Jenkins and Ward (1965) and Alloy and Abramson (1979) procedures in relation to the distinctions made above suggests that the results obtained in these studies may not be exclusively concerned with subjects' contingency perception tendencies due to the confounding of the contingency and control concepts in subjects' instructions for these tasks. More specifically, it appears that the specific wording of subjects' instructions in these procedures may have encouraged subjects to misinterpret their tasks in either of two ways: (1) that they were to rate their actual, demonstrated degree of efficacy in obtaining desired outcomes on these problems, or (2) that they were to rate their perceived efficacy in identifying and executing appropriate controlling responses on these problems. Each of these suggestions will be considered in more detail below.

First, it would appear that the mere use of the term "control" in the description of subjects' task would suggest to subjects that their task is not so much one of judging the degree of contingency that is present in the problems as it is one of assessing their overall capacity to obtain desired outcomes on these problems: To assess one's degree on control over an outcome is to assess one's capacity to selectively influence that outcome in desired directions. Thus, given that subjects are directed to rate "the degree of control which had been exerted over the outcomes by response choices," as was the case in the Jenkins and Ward procedure (p. 6), it does not seem particularly surprising that these ratings were highly correlated with the actual frequency with which they obtained these outcomes (i.e., with reinforcement frequency). Thus, the finding that nondepressed subjects' "contingency" judgements were highly correlated with reinforcement frequency in Jenkins and Ward's study and in Experiment II of Alloy and Abramson's study may be due to the fact that these subjects interpreted the concept of "contingency" to be equivalent to one's capacity to obtain desired outcomes, as implied by the instructions they received for these tasks.

It also appears that subjects' instructions in these procedures were worded in such a way as to encourage subjects to interpret their tasks as one of rating their

perceived efficacy in identifying and executing appropriate controlling responses on tnese problems rather than one of rating the degree of contingency that they perceived. First, it may be seen that these instructions define the concept in such a way that it would incorporate subjects' efficacy judgements. For example, Jenkins and Ward's (1965) instructions state that "complete control means that you can produce the score light . . . on any trial by your choice of responses" (p. 6). Similarly, Alloy and Abramson's (1979) instructions state that "no control means that you have found no way to make response choices so as to influence in any way the onset of the green light" (p. 451). Clearly, the concept of "contingency" which is defined by these instructions is one which concerns subjects' judgements not only of the degree of contingency present in the problems, but also of their efficacy in identifying and executing appropriate controlling responses.

In addition to the general confounding of the contingency and control conceptions, referred to above, the instructions in these studies also seem to directly imply at several points that subjects do have the potential for control over the outcomes in the task. For example, Alloy and Abramson's instructions refer to their study as a "problem-solving experiment" (p.451), and Jenkins and Ward's instructions describe subjects' task as being one of "finding a way to respond which will make the score

light appear as often as possible" (Score instructions), and of "finding a way to control which of the outcomes . . . will appear on any trial" (Control instructions) (p. 6). Clearly, these instructions emphasize the identification of appropriate controlling responses much more strongly than they do the perception of response-outcome relationships. In this manner, it appears that these instructions imply to subjects that the outcomes within the tasks are contingently related to some potential response on their part, and, therefore, that their real task is to identify the extent to which they are able to identify and execute the appropriate controlling response. It appears that this interpretation of the task would be particularly encouraged by the instructions for the conditions in which subjects are specifically directed to obtain particular outcomes, as in Jenkins and Ward's Score condition (described above) or in Alloy and Abramson's win and lose conditions (Experiments III and IV): "Now, in this problem-solving experiment it is your task to learn how to turn on this green light" (p.464). Specific encouragement to pursue a particular outcome seems tantamount to declaring that a contingent response-outcome relationship does exist, and, therefore, that subjects' task is to first attempt to identify and execute the appropriate controlling responses and to then rate their degree of efficacy in doing so.

There are specific indications in the results obtained from the Alloy and Abramson (1979) study to indicate that at least some subjects, under some circumstances, did interpret their task as being more concerned with the identification and execution of appropriate controlling responses than with the perception of response-outcome relationships. It may be recalled that the nondepressed subjects in their Experiment II, and nearly all subjects in the win and lose conditions of Experiment III, reported attempting complex hypotheses during these tasks (Alloy & Abramson did not report the number of subjects responding in this manner in Experiment IV). These findings suggest that these subjects did not interpret their task in the manner intended by the experimenters, since they should have been concerned only with the relationship between the two identified response choices and the occurrence of the outcomes if they had interpreted it as intended. These findings also suggest that particular characteristics of these subjects and/or these conditions may particularly foster interpretation of the task in this manner.

In regard to the finding that all subjects reported making complex hypotheses in Alloy and Abramson's Experiment III (i.e., in the win and lose conditions), it was noted earlier that the instructions for this experiment seem to particularly encourage interpretation of the task in terms of efficacy rather than contingency, because

of the fact that these instructions specified that subjects were to pursue particular outcomes. Thus, it appears that the self-serving bias evidenced by the nondepressed subjects under the win and lose conditions might be much more reflective of biases and distortions in subjects' judgements regarding their efficacy in identifying and executing appropriate controlling responses than they are of their contingency perception tendencies. Although it might seem that such distorted efficacy judgements could not occur on this type of task because of the extremely limited and simplistic response repertoire involved (either press or do not press the button), it must be recalled that subjects apparently did not perceive their response repertoire in this manner. The fact that subjects engaged in complex hypothesis testing on these tasks suggests that subjects perceived that they had a wide range of response choices. Thus, it appears that subjects' interpretations of their response repertoire would provide them with sufficient latitude to misperceive either that they were or were not successful in identifying and executing some complex controlling response.

It is interesting to note, in regard to the above discussion, that depressed subjects' ratings on the judgement of control scales in Alloy and Abramson's (1979) study did correspond with the actual response-outcome contingencies present in the problems. There appear to be

at least two, possibly overlapping, explanations for this discrepancy from the performance of the nondepressed subjects. First, it may be that the depressed subjects, in contrast to the nondepressed subjects, actually did interpret their task in these experiments as one of contingency perception, as intended by the experimenters. This suggestion is at least partially supported by the finding that depressed subjects attempted fewer complex hypotheses in Alloy and Abramson's (1979) Experiment II than did did the nondepressed subjects. Such differing interpretations of their tasks by the two groups could reflect differences in the salience of the two types of judgements in the two groups: For example, depressed subjects may be particularly concerned with assessing the degree of contingency between their responses and subsequent outcomes, whereas nondepressed subjects may be relatively more concerned with evaluating their capacity to identify and execute controlling responses. It also appears possible that the differences in the performance of the two groups may reflect real differences between the two groups, but in regard to factors other than contingency perception. For example, these findings may indicate that depressed subjects are relatively accurate in their assessments of their efficacy in identifying and executing controlling responses, whereas nondepressed subjects may display self-serving biases in these judgements.

The second major issue raised by the review of prior research relating to the contingency perception tendencies of depressed and nondepressed subjects concerns the neglect of a potentially significant aspect of the contingency judgement process.[1] In almost all of the studies reviewed above the contingency perception process has been reduced to an essentially mathematical, information-processing phenomenon. In the Alloy and Abramson (1979) procedure, for example, subjects' task, as conceptualized by the experimenters, can be summarized as follows: (1) press the button on about half of the trials and do not press it on the remainder, (2) observe the relative frequency with which the green light occurs given each of the above responses, (3) transform these observations into conditional probability estimates, and (4) estimate the differential probability of green light onset given either of the two responses. Thus, subjects are given repeated opportunities to examine a single response-outcome relationship while varying their behavioral response. Subjects have only to appropriately sample the responses available to them and to correctly process the available information in order to discover the objective degree of contingency present in the task.

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[1] The discussion of this second issue will ignore the contingency-control confound discussed above in regard to this research. Thus, it will be assumed, for purposes of this discussion, that these prior studies have actually examined the contingency judgement process.

The type of contingency judgement just described may be contrasted with the type of contingency judgements subjects are likely to encounter in their everyday lives. These judgements are much more likely to concern ambiguous, single-occurrence events where the objective degree of contingency cannot be definitively determined through repeated experimentation. For example, if a man is fired from his job, or if he is involved in a serious automobile accident, he does not have the opportunity to repeat the event multiple times, while varying his response, in order to determine the degree of contingency involved. Nevertheless, it appears that subjects do make contingency judgements on the basis of such limited information, and it appears that any differences between the contingency perception tendencies of depressed and nondepressed subjects would be most likely to be evidenced under such ambiguous conditions.

The significance of the distinction made above between the two types of contingency judgements is made clear when it is considered that subject differences on each type of judgement may reflect different psychological processes. Subject differences on the type of contingency judgement examined by Alloy and Abramson (1979) would appear primarily indicative of differences in subjects' capacity to accurately process the information gathered during their repeated examination of the response-outcome

relationship—to a considerably smaller degree it would seem that these variations might also reflect underlying biases in subjects' contingency perception tendencies. In contrast, subjects' judgements of contingency for ambiguous events would appear to be highly indicative of any such underlying biases that subjects might have either toward or against the perception of contingency between their responses and subsequent outcomes.

The distinctions made between these two types of contingency judgements may also be seen to correspond, roughly, to different stages in the contingency perception process as presented by Crocker (1981). Judgements of ambiguous, single-occurrence events may be seen to correspond to stage three of her model, in which subjects classify specific instances as being either indicative or contraindicative of a contingent relationship between a particular response and outcome. The type of judgement assessed by Alloy and Abramson's (1979) procedure appears to be concerned exclusively with processes corresponding with Crocker's stages four and five, dealing only with the processing of contingency-judgement information and the derivation of global contingency judgements on the basis of this information. Additionally, the information that is involved here consists of the relatively clear-cut information provided by repeated exposures to a single response-outcome relationship, and not that provided by subjects' own decisions

regarding the degree of contingency present in more ambiguous situations. Thus, it would appear that subjects' judgements in the Alloy and Abramson procedure would not reflect any biases subjects might potentially evidence at stage three of Crocker's model, but be reflective only of any biases they might display at stages four and five.

The above distinctions suggest that while Alloy and Abramson's (1979) findings may provide considerable information regarding the relative accuracy with which subjects process information pertaining to contingency judgements, these findings may actually provide relatively little information regarding subjects' basic tendencies to perceive contingency between their responses and subsequent outcomes under more ambiguous conditions. Thus, their major finding may need to be reinterpreted to suggest that depressed subjects are relatively accurate in their processing of contingency judgement information, whereas nondepressed subjects are prone to self-enhancing and self-protective biases in their processing of such information. It remains possible, however, that depressed subjects might still be either more or less prone to perceive contingency when actually faced with ambiguous, single-occurrence events than are nondepressed subjects.

The only study that has attempted to assess subjects' contingency perception tendencies for ambiguous, single-occurrence events is that of Miller (Note 1). It may

initially appear that Miller's procedure does not examine subjects' contingency perceptions for single-occurrence events, since it involves repeated trials as does the Alloy and Abramson (1979) procedure. It must be recognized, however, that the repeated trials in Miller's procedure require that subjects make a series of contingency judgements for a number of distinct response-outcome relationships, since each trial involves different word association items. Thus, while Miller's procedure does not assess subjects' contingency judgements on a trial-by-trial basis, it may be seen that subjects' contingency judgements in this procedure are reflective of such judgements, since they are derived from their experiences with a series of ambiguous, single-occurrence events. These types of judgements are not assessed at all in the other contingency perception studies.

In summary, almost all of the prior research regarding subjects' contingency perception tendencies has been complicated by serious conceptual and methodological difficulties which make clear interpretation of their results impossible. In particular, it appears that these studies have confounded the concepts of contingency and control in their procedures, making it difficult to determine if their findings relate to subjects' contingency perception tendencies or to their perceptions of their efficacy in identifying and executing appropriate controlling responses.

It also appears that these studies have focused exclusively upon a rather limited aspect of the contingency perception process (involving the processing of clear-cut contingency-judgement information), and ignored other, potentially more significant, aspects of this process (e.g., subjects' judgements of the degree of contingency present in ambiguous, single-occurrence events).

Introduction to the Current Research Effort

The current research effort attempts to correct some of the conceptual and procedural shortcomings noted in the prior research in order to clarify the manner in which depressed and nondepressed subjects perceive contingency between their responses and subsequent outcomes. Specifically, a new methodology for assessing subjects' contingency perception tendencies is developed and applied in the current research effort. This new methodology seeks to eliminate the confound noted in prior studies between the concepts of contingency and control, and to allow for examination, not only of subjects' processing of contingency judgement information, but also of their tendencies to classify ambiguous, single-occurrence outcomes as being either contingent or noncontingent.

During the development of the current methodology, efforts were made to simply modify Miller's (Note 1)

procedure, since his methodology was seen to involve subjects' contingency perceptions for ambiguous, single-occurrence events, and not to overtly confound subjects' contingency and control judgements. Specifically, conditions were added to Miller's procedure to allow for examination of subjects' contingency judgements for both positive and negative events, and to associate the perception of noncontingency with continuing longer on the task. However, pilot testing showed these procedures to be excessively difficult for subjects to understand, resulting in extreme variability in their responses to the task. Additionally, it was noted that the nature of the stop-score procedure made it difficult to make comparisons across subjects (since they could receive different experiences on the task), and that it created difficulties in data analysis by requiring the use on nonparametric statistics.

In view of the difficulties encountered in the effort to simply modify Miller's (Note 1) procedure, a new methodology for assessing subjects' contingency perception tendencies was developed for the current research. Miller's ambiguous word association task is also employed in this methodology, but his stop-score dependent measure has been dropped in favor of a more straightforward rating scale format (similar to the assessment methods employed by Alloy & Abramson, 1979, and Jenkins & Ward, 1965, but

with the confounds with the concept of control removed). Specifically, in the current procedure subjects are faced with the ambiguous word association task with the instructions that they will receive, in varying proportions, three different types of feedback: contingent feedback, noncontingent positive feedback, and noncontingent negative feedback. They are then exposed to varying amounts of noncontingent positive and negative feedback on this task and subsequently asked to rate the degree to which they felt the outcomes they received actually corresponded with the accuracy of their responses.

Several different contingency perception measures are employed in the current research: These are considered to evaluate subjects' contingency judgements at different points in the contingency perception process (e.g., one measure is considered to be highly reflective of subjects' trial-by-trial judgements, whereas another is considered to be more reflective of their final, integrated contingency judgement following full cognitive processing of all contingency-judgement information). It was hoped that variations in subjects' contingency judgements among these measures would help to differentiate any biases they might display in their contingency judgements for ambiguous, single-occurrence events versus biases in their processing of contingency judgement information.

Several additional performance-related measures are also included in the study. Separate scales were developed in order to assess subjects' judgements regarding their ability to perform the word association task and their capacity to exercise control over the occurrence of the outcomes in the tasks. These measures were included in order to further differentiate subjects' contingency perceptions from their judgements of their efficacy in performing appropriate controlling responses, and from their overall judgements regarding their capacity to control outcomes. Another measure is included in the current study in order to check for distortions in subjects' recall of the outcomes they received during the tasks. A final measure is included to contrast subjects' approach to the tasks (i.e., the number of times that they tried to give correct versus incorrect answers during the task).

It is extremely difficult to establish specific hypotheses for the current research: The serious conceptual and methodological difficulties, discussed above, in regard to the prior research in this area result in there being essentially no clear-cut findings upon which to base the development of such hypotheses. Thus, no specific set of hypotheses will be presented for the current research effort. However, several possible predictions for this research may be briefly considered. It is important to recognize that these predictions must be developed in

relative terms, since the procedure concerns subjects' judgements for amgiguous response-outcome relationships for which there are no "accurate" judgements. Thus, it is not possible to predict that either group will be more accurate than the other in their judgements, but only that one group will tend to perceive either greater or smaller amounts of contingency relative to the other under particular reinforcement conditions.

One possible prediction for the current research could be based upon the possibility that the conclusions of the prior research in this area have been accurate in spite of the conceptual and methodological difficulties discussed above—i.e., that depressed subjects may be relatively accurate in their contingency judgements, whereas nondepressed subjects evidence self-serving biases. Although it is not possible to directly address the accuracy of subjects' judgements in the current research, such a prediction would be supported if it were found that depressed subjects' judgements varied only minimally with changes in reinforcement frequency, whereas those of nondepressives indicated greater amounts of contingency under high-frequency positive feedback conditions and smaller amounts of contingency under high-frequency negative feedback situations.

Alternately, it might be suggested that the predictions of the LH model would be supported once the confound

between the contingency and control concepts was removed and/or once subjects' contingency judgements for ambiguous, single-occurrence events were assessed (as opposed to the assessment of their capacity to process clear-cut contingency judgement information). The predictions of the LH model would be supported by the finding that depressed subjects underestimated contingency, relative to the nondepressed subjects, in all, or nearly all, reinforcement conditions.

Finally, a number of other specific predictions might be made for the current research. For example, it might be predicted that depressed subjects would be more prone to perceive contingency between their responses and subsequent outcomes, not less prone as predicted by the LH model. Such a prediction would be consistent with more traditional self-blame models of depression (e.g., Beck, 1967), and with attributional findings indicating that depressed subjects assume more responsibility for both positive and negative outcomes than do nondepressed subjects (e.g., Kuiper, 1978; Rizley, 1978). It might also be predicted that depressed subjects might display a "self-deprecating bias" (in contrast to nondepressed subjects' self-serving bias), tending to perceive less contingency for positive outcomes than for negative outcomes. Finally, it might even be predicted that depressed and nondepressed subjects will show no differences at all in their

contingency perception tendencies, but, possibly, that they would show significant differences in their judgements of their ability on the word association task and/or their judgements of their capacity to control the outcomes they received during these tasks. Such a prediction would be consistent with the suggestions, made above, that the prior research studies in this area may have been more concerned with differences in subjects' efficacy and control judgements rather than with differences in their contingency perception tendencies.

CHAPTER TWO
METHOD

Subjects

Source of Subjects

All subjects employed in the current research were undergraduate psychology students at the University of Florida. Subjects participated in the study in order to partially fulfill psychology course requirements, and they received no additional compensation for their participation. The final sample of 80 subjects employed in the study was drawn from a pool of 604 students who had previously been administered a depression inventory (described below) for screening purposes. This pool of subjects was comprised of two samples: (1) a primary sample, containing 396 subjects, which received the depression inventory during the first week of the academic semester (approximately 2 months prior to follow-up testing), and (2) a secondary sample, containing 208 subjects, which received the depression inventory about 2 weeks prior to follow-up testing.

The objections of Depue and Monroe (1978) to the use of nonclinically depressed populations in examinations of

the LH phenomenon were considered. However, it appears, as Seligman (1978) has argued, that the use of nonclinically depressed college students as subjects in LH experiments may be appropriate when it is recognized that the conclusions from such research may be applicable only to mildly depressed populations. It also appears that college students may appropriately be used, as in the current research, to screen new research conceptualizations thought to be applicable to more severely depressed populations. It must be recognized, however, that the conclusions from such research may not be assumed to be applicable to clinical populations without appropriate follow-up studies.

Subject Selection Procedure

Subjects meeting the preliminary criterion for admission to either the depressed or nondepressed groups on the basis of their score on the screening instrument (admission criteria are discussed below) were contacted and invited to participate in a second part of the study for additional class credit. Priority in scheduling went to subjects in the primary sample in order to maximize the selection of non-transiently depressed and nondepressed subjects. Subjects who agreed to participate in the second part of the study were seen individually by the experimenter, at which time they were administered a second depression inventory and then the experimental procedures. Only those subjects

who also satisfied a secondary admission criterion on this second depression measure were retained in the final sample. Testing was continued until each cell of a 2 (mood) X 2 (sex) X 2 (task order) design was filled with 10 subjects. Thus, the final 80-subject sample was comprised of a 40-subject depressed group and a 40-subject nondepressed group, with each group being evenly balanced as to sex and task order.

Subject Selection Instruments Employed

Beck Depression Inventory

The long form of the Beck Depression Inventory (BDI) (Beck, 1967) was employed in this study as the primary screening device for identifying depressed and nondepressed subjects. Although Depue and Monroe (1978) have questioned the appropriateness of this instrument for the assessment of mild depression, Seligman (1978) has defended it use in LH studies and has reported a number of research findings supporting its use for such purposes. Additionally, Bumberry, Oliver, and McClure (1978) have reported high correlations in a college population between BDI scores and clinical ratings of depression based upon psychiatric interviews. The decision to employ the BDI as the primary measure of depression in this study was based upon this evidence. It was also noted that the BDI has been, by far, the most frequently used measure of depression in

prior LH research. Thus, use of the BDI was considered to enhance the comparability of the current findings with prior research in this area.

Full BDI scores were calculated for all subjects in accordance with the instructions of Beck (1967). Scores on the scale range from 0 to 63, with higher scores indicating greater severity of depression. The criterion for admission to the depressed group was set at BDI $\geq$ 10. This score is considered by Kovacs and Beck (1977) to represent the low end of the mild range of depression, and it has been recommended as the appropriate cut-off score for detecting depression in normal and medical populations (Schwab, Bialow, Clemmons, Martin, & Holzer, 1967). The criterion for admission to the nondepressed group was set at BDI $\leq$ 2.

Self-rating Depression Scale

The Self-rating Depression Scale (SDS) (Zung, 1965 & 1973) was employed in this study as a secondary measure of depression. This instrument is comparable to the BDI in that it is a brief, self-administered scale which samples a wide range of symptom categories. This instrument was chosen for use in this study in favor of the Multiple Affect Adjective Checklist (MAACL) (Zuckerman & Lubin, 1965) which has been more commonly employed as a secondary depression measure in prior LH research. The SDS was

chosen for use in the current research because it was seen to provide a broader assessment of the depressive syndrome than does the MAACL, which is designed to assess only transient depressive affect.

Scores on the SDS were calculated in accordance with the instructions provided by Zung (1965 & 1973). Scores on the scale range from 25 to 100, with higher scores indicating greater severity of depression. Prior normative studies (e.g., Zung, 1965, 1971, & 1972) have established relatively good norms for subjects aged 20 to 50. However, younger and older subjects have tended to obtain higher scores than those within this range. Since subjects used in the current research fell right at the borderline age for which good normative data are available, it was subsequently decided to administer the SDS to a large sample of college students in order to establish appropriate cut-off scores for the current research. It was determined in advance that appropriate cut-off points would be set at the 30th percentile for the nondepressed group and at the 70th percentile for the depressed group. Following administration of the SDS to 208 students, the following were established as the secondary admission criteria: SDS $\leq$ 38 for the nondepressed group, and SDS $\geq$ 48 for the depressed group.[1]

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[1]The SDS was administered along with the BDI to the 208 subjects comprising the secondary sample of the subject pool used to select subjects for the current research. (Subjects who were drawn from this sample to participate

Experimental Design

Overview of Procedure

Following completion of informed consent forms and the SDS, subjects were administered three versions of a perception of contingency task (PCT), completing a follow-up questionnaire after each version of the PCT. The three versions of the PCT were presented in either of two orders, with half of the subjects in each group receiving them in one order and the other half in the second order.

Perception of Contingency Task

Description of task. The PCT was adapted from Miller (Note 1) who developed a perception of noncontingency task using a word association procedure previously employed by Wener and Rehm (1975) and Kuiper (1978). This procedure involved a list of 100 stimulus words and their two most popular associates. These words had been selected on the basis of word association norms (Bilodeau & Howell, 1965; Palermo & Jenkins, 1963; and Rapaport, Gill, & Schaefer,

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in the experimental procedures were selected on the basis of their BDI scores only—they were also required to satisfy the secondary admission criterion on a readministration of the SDS in order to remain in the final sample.) The cut-off score of SDS $\leq$ 38, which was identified as the 30th percentile, actually included the lower 32.21% of the sample due to the number of tie scores at SDS = 38. The cut-off score of SDS $\geq$ 48, which was identified as the 70th percentile, actually included the upper 31.25% of the sample due to tie scores at SDS = 48.

1946) such that each stimulus word's two most popular associates were known to have approximately equal probabilities of selection. These word association items were employed in the current research to create the three versions of the PCT, with each version containing 32 of these items.

For each task, subjects were told that one of the word association choices in each trial had been determined to be the most popular associate to the stimulus word on the basis of prior research, and that one part of their task would be to decide which of the two choices they thought was this most popular response. Following this initial introduction to the task, subjects were given information regarding the feedback they would receive during the task. The experimenter explained and demonstrated to the subjects that the experimental apparatus could be set in an "accurate feedback mode," such that pressing one of the two buttons on their control panel (ostensibly the one corresponding to the most popular response) would result in the sounding of a bell, whereas pressing the other button (ostensibly the one corresponding to the less popular response) would result in the sounding of a buzzer. The experimenter then explained to the subjects that the experimental apparatus could also be set in two other feedback modes. He explained and demonstrated that pressing either button would result in the sounding of the bell when the device was set in the "positive feedback mode,"

whereas pressing either button would sound the buzzer when the device was set in the "negative feedback mode." The experimenter emphasized in his instructions that the accuracy of subjects' responses would determine the outcomes they received only when the device was set in the accurate feedback mode, whereas the accuracy of their responses would make no difference when the device was set in either the positive or negative feedback modes.

Subjects were told that their primary task in the experiment was to discover how related the sounding of the bell and buzzer were to the accuracy of their responses. They were told that in order to do this they should consider the feedback they received on each trial and try to come to some judgement as to what mode the device was set in. Subjects were advised that they should not necessarily always give what they thought was the correct answer, since it is as important to know how accurate the feedback is when one gives a wrong answer as when one gives a correct one. Subjects were specifically advised that they would receive a total of 32 trials in each task in order to facilitate any effort they might make to equalize the number of correct and incorrect attempts that they made. The full instructions which were read to subjects by the experimenter at the outset of the experimental task are presented in Appendix A. The experimenter deviated slightly from these instructions when necessary to assure subject understanding of the task.

Apparatus and procedure. A visual display screen was employed in the PCT, upon which slides containing the stimulus words and their associates were displayed using a standard slide projector. Below the display screen was the subject's control panel, consisting of two buttons labeled "1" and "2." The experimenter operated a master control panel which was designed such that he could determine, on a trial-by-trial basis, whether the subject's next response triggered the sounding of the bell or the buzzer. The master control panel contained a 4-way toggle switch which was labeled so as to encourage subjects' acceptance of the experimental instructions. Two of the positions of the switch were labeled "1" and "2," with the label "Accurate Feedback Mode" positioned above them. The other two positions of the switch were labeled "Positive Feedback Mode" and "Negative Feedback Mode."

The experimenter sat to the side of, and slightly behind subjects during administration of the PCT, such that he could observe subjects' responses to the slides, but so that subjects were not able to observe his manipulations of the master control panel. After each response, the experimenter recorded the subject's response on a record form and then preset the next feedback before advancing to the next slide. This procedure provided a relatively uniform 4-5 second inter-trial interval during which the subject could evaluate the accuracy of the feedback he received.

Feedback was administered noncontingently for all trials of each task in a predetermined sequence. In Task A, subjects received 16 positive outcomes (bell) and 16 negative outcomes (buzzer); in Task B, they received 24 positive outcomes and 8 negative outcomes; and in Task C they received 8 positive outcomes and 24 negative outcomes. The stimulus words, their equal probability associates, and the noncontingent feedback schedules for each task are presented in Appendix B.

All subjects were initially administered Task A of the PCT. The order of the remaining two tasks was counterbalanced such that half the subjects in each group completed Task B and then Task C (Order 1), whereas the remaining subjects completed Task C and then Task B (Order 2). Full counterbalancing of task order was considered unfeasible because of the sample size limitations in the study. The decision to have all subjects start with Task A was based upon the assumption that this task would provide the most affectively neutral experience for subjects, and that it would, therefore, be least likely to result in any complicating carry-over effects.

Follow-up Questionnaire.

General description. Subjects were administered an identical follow-up questionnaire following each version of the PCT. The full versions of these questions (See

Appendix C) were read to subjects by the experimenter following Task A; subjects completed these questionnaires on their own following Tasks B and C, although they were provided with a written copy of the full versions of the questions and allowed to consult the experimenter if they did not understand a question. Subjects recorded their own responses to the follow-up questionnaire using a follow-up questionnaire answer sheet (See Appendix D).

Eight of the 12 items on each questionnaire required subjects to make a percentage estimate by marking at some point along a 5 inch line—anchor points were provided at the 0%, 50%, and 100% positions. These scales were scored by first measuring the distance (in inches) from the 0% position to the point marked by the subject. This distance was then converted into a percentage score by dividing it by 5 and then multiplying by 100.

The remaining four items of each questionnaire required subjects to estimate the number of trials on which a particular event occurred. These four items consisted of two sets of paired questions such that subjects' responses to the two parts of each pair should sum to equal the total number of trials (32) in each task. The questions comprising the three follow-up questionnaires contained all of the dependent measures for the experiment as described below.

Description of dependent measures. The first six items of each follow-up questionnaire were used to assess subjects' contingency perceptions on that task. Question #1 asked subjects to estimate the percentage of trials the device was set in each of the three feedback modes (subjects were specifically instructed that their three estimates should total as close as possible to 100%). Subjects' responses to the three parts of this question were considered to reflect their tendencies to classify ambiguous, single-occurrence outcomes in each of the following ways: (1) as contingent positive or negative events (accurate feedback mode), (2) as noncontingent positive events (positive feedback mode), or (3) as noncontingent negative events (negative feedback mode). This measure was considered to provide the most direct indication of any biases subjects might evidence in their classification of such ambiguous instances, and to be least reflective of any biases subjects might evidence in the processing of such information. In effect, this measure asked subjects to simply recall their trial-by-trial classifications and to transform these into percentage estimates.

Each of the three percentages obtained in Question #1 was considered to provide a measure of subjects' tendencies to classify and recall events as being contingently related to their responding. The accurate feedback percent estimate was considered to provide the broadest

assessments of subjects' tendencies to classify and recall outcomes as being contingently related to their responding: the higher the percentage, the greater the tendency to classify and recall events as being contingently determined. The positive feedback percent and negative feedback percent measures were considered to provide more specific assessments of subjects' tendencies to classify and recall positive and negative outcomes, respectively, as being contingently related to their responding: the lower the percentage, the greater the tendency to classify and recall that category of outcomes as being contingently determined.

Question #2 asked subjects to estimate the frequency with which they thought the desired outcome (bell) would occur given either the presence or absence of a correct response (subjects were specifically instructed that their responses to the two parts of this question did not have to total to 100%). Subjects' responses to part one of this question were considered to reflect their subjective estimates of the probability that the desired outcome would occur given a correct response ($p(O/R)$); their responses to part two of this question were considered to reflect their subjective estimates of the probability that the desired outcome would occur given the absence of a correct response ($p(O/\overline{R})$). It was assumed that greater tendencies toward the perception of contingency would be indicated by higher estimates to part one of the measure

(probability of the bell given a correct response) and lower estimates to part two (probability of the bell given an incorrect response). A broader measure of subjects' contingency perception tendencies was developed from these estimates by calculating the absolute value of the difference between them: Greater differences between the two estimates were seen to reflect greater tendencies toward the perception of contingent relationships. This measure may be seen to parallel the theoretical definition of contingency provided earlier in this paper (i.e., the arithmetic difference between $p(O/R)$ and $p(O/\overline{R})$). The three contingency measures derived from Question #2 were considered to reflect an intermediate stage of the contingency judgement process: It was assumed that these estimates reflected greater amounts of cognitive processing of subjects' trial-by-trial judgements than did the feedback percent estimates, but less than was involved in their global contingency ratings (discussed below).

Question #3 provided the final measure of subjects' contingency perception tendencies. This measure consisted of a single question asking subjects to rate the overall degree of correspondence between the sounding of the bell and buzzer and the accuracy of their responses. This measure was assumed to provide the highest level assessment of subjects' contingency perception tendencies, reflecting the greatest amount of additional cognitive processing.

The remaining six items of the follow-up questionnaire were used to form four performance-related dependent measures. Question #4 asked subjects to assess their efficacy in performing the word association task. This measure was included in the study in order to further differentiate subjects' contingency perception tendencies and their judgements regarding their efficacy in performing the appropriate controlling response. It was subsequently recognized, however, that the relationship between subjects' estimates of their ability and their perceptions of contingency on the tasks might be more direct. In particular, it was considered possible that highly confident subjects might be more prone to perceive a lack of contingency on these tasks than would less confident subjects. For example, a highly confident subject who receives feedback which is incongruent with his expectations might be expected to view this feedback as noncontingent, whereas a less confident subject who receives the same amount of incongruent feedback might simply conclude that his expectations were incorrect. If this type of relationship were to exist, then it would be expected that subjects' judgements of contingency would correlate negatively with their ability estimates on each of the three tasks.

It was also recognized that the direction of any direct causal relationship between subjects' ability estimates and their perceptions of contingency might be reversed

from that described above. For example, the subject who perceives that the positive feedback he is receiving is contingent upon his responses may be influenced by this feedback to make higher estimates of his ability than the subject who concludes that the positive feedback is noncontingent. If this type of relationship were to exist, it would be predicted that subjects' estimates of their ability would be positively correlated on Task B, negatively correlated on Task C, and uncorrelated or weakly correlated on Task A. Although the current procedure was not designed to fully examine the nature of this relationship, it was felt that some assessment of this relationship was needed in order to rule out the possibility that subjects' contingency estimates were mere reflections of their varying levels of confidence in their ability to perform the word association task, and not true reflections of their contingency perception tendencies.

Question #5 asked subjects to rate the degree of control they felt they had over the outcomes they received in the various tasks. This measure was included to further differentiate subjects' perceptions of contingency from their judgements of control.

Question #6 asked subjects to simply recall the number of positive and negative outcomes they received during each task. Subjects were reminded, in conjunction with this question, that they had completed a total of 32 trials

during each task—this was done in order to eliminate the variability associated with some subjects remembering this fact from prior instructions and some subjects assuming that they had received either a larger or smaller number of total trials. This item was included in order to check for distortions in subjects' recall of the feedback they received during the tasks.

Question #7 asked subjects to recall the number of times during the task that they attempted to give correct versus incorrect responses. Again, subjects were reminded, in conjunction with this question, that they had completed a total of 32 trials. This question was included in order to contrast subject's approach to the task. Variations here were assumed to correspond to sampling variations of the sort referred to in step 1 of Crocker's (1981) model of the contingency perception process. It was also recognized, however, that variations in subjects' approach to the task could directly influence their contingency judgements by altering the amount of confirming versus disconfirming feedback that they received. For example, a subject who always tried to give the correct response while receiving the noncontingent negative feedback of Task C would certainly be expected to give lower contingency judgements than the subject who always tried to give incorrect responses on this task.

If variations in the number of positive versus negative

efforts made by subjects were to influence their contingency judgements in the manner described above, then it would be expected that there would be a positive correlation between the number of positive efforts and judgements of contingency on Task B, since increasing numbers of positive efforts should increase the amount of confirming feedback that is received (i.e., feedback that is consistent with subjects' expectations, assuming that a contingent relationship exists). On Task C, it would be expected that such a relationship would result in negative correlations between subjects' contingency judgements and the number of positive efforts, since this approach would result in greater amounts of disconfirming feedback on this task. Finally, no significant correlation would be expected on Task A, given such a relationship, since variations in subjects' approach to this task should not affect the amount of confirming versus disconfirming feedback received (the amount of confirming versus disconfirming feedback should be approximately equal regardless of subjects' approach). Thus, this measure was included to assess any sampling biases subjects might evidence on these tasks, as well as to examine the impact these differences might have on subjects' contingency judgements. Again, the primary concern is to assure that any observed differences on the contingency perception measures are truly reflective of contingency perception tendencies and not other factors, such as subjects' approach to the task.

Overview of Statistical Procedures

All dependent variables were analyzed using a 2 (group) X 2 (sex) X 2 (task order) X 3 (task) repeated measures analysis of variance procedure. Follow-up analyses were conducted using the least significant difference (LSD) procedure, for paired comparisons, and Duncan's new multiple range test, for multiple comparisons. A small number of additional group comparisons were conducted using Student's *t*-test procedure. The interrelationships among selected dependent variables were analyzed using Pearson's product-moment correlation procedure. All tests of significance were two-tailed and set at the .05 level of significance.

CHAPTER THREE
RESULTS

Description of the Final Sample

Identification of the the 40 depressed subjects employed in the final sample required the testing of 58 subjects who met the preliminary criterion for admission to the depressed group. Sixteen to the 58 subjects were dropped from the final sample for failure to satisfy the secondary criterion for admission to the depressed group. Two additional subjects were dropped from this group because of improper marking of responses on the follow-up questionnaires.[1]

Identification of the 40 nondepressed subjects employed in the final sample required the testing of 50 subjects who met the preliminary criterion for admission to the nondepressed group. Nine of the 50 subjects were dropped from the final sample for failure to satisfy the secondary criterion for admission to the nondepressed group. One additional subject was dropped from this group

[1]These two subjects marked only the anchor points on all three of the questionnaires, seemingly not recognizing that they could mark intermediate points. The decision to drop these subjects was made before their group membership was known.

because he found it extremely difficult to understand the experimental instructions.[2]

The final 80-subject sample was drawn largely from the primary sample of subjects that had received the BDI during the first week of the academic semester. Specifically, 82.5% of the final sample was drawn from this group, indicating that 66 of the 80 subjects satisfied the two admission criteria across a time span of approximately two months. The remaining 14 subjects were drawn from the secondary sample of subjects where the time span between their satisfaction of the two admission criteria was about two weeks. The depressed group was drawn somewhat more heavily from the secondary sample than was the nondepressed group (22.5% for the depressed group, versus 12.5% for the nondepressed group) due to the fact that a greater number of subjects had to be tested in order to fill the depressed group.

Depression inventory means for the final sample are presented in Table 1 by group, group X sex, and group X order. These figures reveal that the selection procedures resulted in a marked separation between the depressed and nondepressed groups. Analysis of the sub-group means using the t-test procedure revealed that the depressed

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[2]This subject was a foreign student whose understanding of the English language was rather limited. Again, the decision to drop this subject from the final sample was made before his group membership was known.

Table 1. Final sample depression inventory means and standard deviations by group, group X sex, and group X order.

		BDI		SDS	
Grouping	n	Mean	SD	Mean	SD
Depressed	40	14.925	4.725	55.125	6.231
Nondepressed	40	0.250	0.439	32.425	3.544
Depressed					
Males	20	13.450	3.000	53.400	6.047
Females	20	16.400	5.679	56.850	6.072
Nondepressed					
Males	20	0.200	0.410	33.100	3.478
Females	20	0.300	0.470	31.750	3.567
Depressed					
Order 1	20	14.950	4.006	57.500	7.164
Order 2	20	14.900	5.457	52.750	4.064
Nondepressed					
Order 1	20	0.300	0.470	32.800	3.592
Order 2	20	0.200	0.410	32.050	3.546

females in the sample obtained significantly higher BDI scores than did depressed males (t (38) = 2.05, p < .05), and that the depressed females tended to obtain higher scores than depressed males on the SDS (t (38) = 1.80, p < .08). It was also discovered that depressed/Order 1 subjects obtained significantly higher SDS scores than did depressed/Order 2 subjects (t (38) = 2.58, p < .02).

Perception of Contingency Measures

Percentage of Trials in Each Feedback Mode

Subjects' raw score estimates of the percentage of trials the device was set in each of the three feedback modes were transformed prior to statistical analysis so that the sum of each subject's three scores actually totaled 100%. This was accomplished by dividing each score by the sum of the three scores and then multiplying by 100. This transformation was undertaken in order to assure that all subjects' scores had an equal influence in the determination of group means. The results of this transformation are reflected in Table 2 which presents a comparison of mean feedback percentage estimates for transformed and nontransformed data by group. These figures reveal that this transformation resulted in only minimal changes in the data.

Accurate feedback percent. Analysis of subjects' transformed estimates of the percentage of trials the

Table 2. Comparison of mean feedback percentage estimates for transformed and nontransformed data by group.

Group	Accurate Feedback Percent	Positive Feedback Percent	Negative Feedback Percent	Total
Depressed				
Nontransformed	43.817	25.117	30.008	98.942
Transformed	44.585	25.332	30.083	100.000
Nondepressed				
Nontransformed	34.483	29.500	34.008	97.991
Transformed	35.621	29.876	34.503	100.000

device was set in the accurate feedback mode (signifying the perception of contingent feedback) yielded significant main effects for group and task, and a marginally significant main effect for sex. Means and significance values for these effects are presented in Table 3 (complete results of this analysis are presented in Table E-1 of Appendix E).

The significant main effect for group indicates that depressed subjects recalled classifying significantly more of the outcomes they received as contingent events than did the nondepressed subjects ($p < .006$). Further analysis of the significant main effect for task, using post-hoc Duncan's comparisons, revealed that subjects recalled classifying significantly fewer outcomes as contingent events in Task C than in either Task A or B ($p < .001$); their estimates for Tasks A and B did not significantly differ. Examination of the marginally significant main effect for sex indicates that males tended to perceive greater amounts of contingent feedback than did females ($p < .06$).

Positive feedback percent. Analysis of subjects' transformed estimates of the percentage of trials the device was set in the positive feedback mode (signifying the perception of noncontingent positive feedback) yielded significant main effects for group and task. Means and significance values for these effects are presented in

Table 3. Means and significance values for significant and marginally significant effects identified by analysis of subjects' transformed accurate feedback percent estimates.

Effect	Mean	F	df	p
Group				
Depressed	44.585	8.30	1,72	.005
Nondepressed	35.621			
Sex				
Males	43.111	3.74	1,72	.057
Females	37.095			
Task				
Task A	48.720			
Task B	44.952	36.53	2,144	.001
Task C	26.637			

Table 4 (complete results of this analysis are presented in Table E-2 of Appendix E).

The significant main effect for group indicates that depressed subjects recalled classifying significantly fewer of the outcomes they received as noncontingent positive events than did nondepressed subjects ($p < .04$). Further analysis of the significant main effect for task, using post-hoc Duncan's comparisons, revealed significant differences between subjects' positive feedback estimates for each of the three tasks ($p < .05$): Subjects reported perceiving the greatest amount of noncontingent positive feedback on Task B, an intermediate amount on Task A, and the least amount on Task C.

Negative feedback percent. Analysis of subjects' transformed estimates of the percentage of trials the device was set in the negative feedback mode (signifying the perception of noncontingent negative feedback) yielded significant main effects for group, sex, and task, and a significant sex X task interaction. Means and significance values for these effects are presented in Table 5 (complete results of this analysis are presented in Table E-3 of Appendix E).

The significant main effect for group indicates that depressed subjects recalled classifying significantly fewer of the outcomes they received as noncontingent negative events than did nondepressed subjects ($p < .04$). The

Table 4. Means and significance values for significant effects identified by analysis of subjects' transformed positive feedback percent estimates.

Effect	Mean	F	df	p
Group				
Depressed	25.332	4.71	1,72	.033
Nondepressed	29.876			
Task				
Task A	23.642			
Task B	41.281	44.41	2,144	.001
Task C	17.890			

Table 5. Means and significance values for significant effects identified by analysis of subjects' transformed negative feedback percent estimates.

Effect	Mean	F	df	p
Group				
Depressed	30.083	4.61	1,72	.035
Nondepressed	34.503			
Sex				
Males	29.986	5.02	1,72	.028
Females	34.600			
Task				
Task A	27.638			
Task B	13.768	202.03	2,144	.001
Task C	55.473			
Sex X Task				
Males				
Task A	24.752			
Task B	14.695			
Task C	50.511	4.00	2,144	.021
Females				
Task A	30.525			
Task B	12.841			
Task C	60.434			

significant main effects for sex and task must be interpreted in light of the significant sex X task interaction.

Further analysis of the significant sex X task interaction, using post-hoc LSD comparisons, revealed that females recalled classifying significantly more outcomes as noncontingent negative events than did males on Task C ($p < .05$), and that they tended in this direction on Task A ($p < .10$). In contrast, males reported a slightly higher percentage of noncontingent feedback than did females on Task B, although this difference did not approach significance. The significant sex X task interaction is depicted graphically in Figure 1.

Post-hoc Duncan's comparisons contrasting the amount of noncontingent negative feedback perceived on each task yielded identical results for both males and females, allowing for straightforward interpretation of the task main effect. These comparisons revealed that subjects perceived significantly different amounts of noncontingent negative feedback on each of the three tasks ($p < .001$): Subjects perceived the greatest amount of noncontingent negative feedback on Task C, an intermediate amount on Task A, and the least amount on Task B.

Comparison of Feedback Judgement Patterns by Group

The above analyses have individually contrasted depressed and nondepressed subjects' percentage estimates

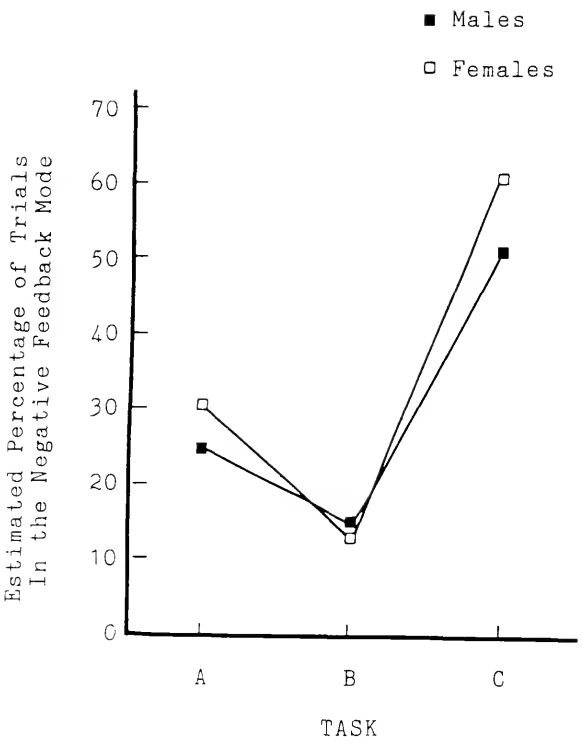


Figure 1. Subjects' negative feedback percent estimates as a function of sex and task.

for each of the three feedback modes. Figure 2 simultaneously presents the mean estimates for each group for all three of the feedback modes, allowing for comparison of the overall pattern obtained by each group. For each group, the differences among subjects' estimates for each of the three modes, across all tasks, were analyzed using a paired-comparisons *t*-test procedure. The results for the depressed group indicated that these subjects judged that the device was set significantly more often in the accurate feedback mode than in either the positive (t (39) = 4.95, $p < .001$) or negative feedback modes (t (39) = 3.41, $p < .01$). The depressed subjects also estimated that the device was set slightly less often in the positive feedback mode than in the negative feedback mode (t (39) = 2.63, $p < .02$).

In contrast to the pattern obtained by the depressed subjects, there was no difference between nondepressed subjects' accurate and negative feedback mode estimates (t (39) = 0.43, ns), and they exhibited only a marginally significant tendency to give higher accurate feedback mode estimates than positive feedback mode estimates (t (39) = 1.87, $p < .10$). However, like the depressed subjects, nondepressed subjects estimated that the device was set significantly less often in the positive feedback mode than in the negative feedback mode (t (39) = 2.26, $p < .05$).

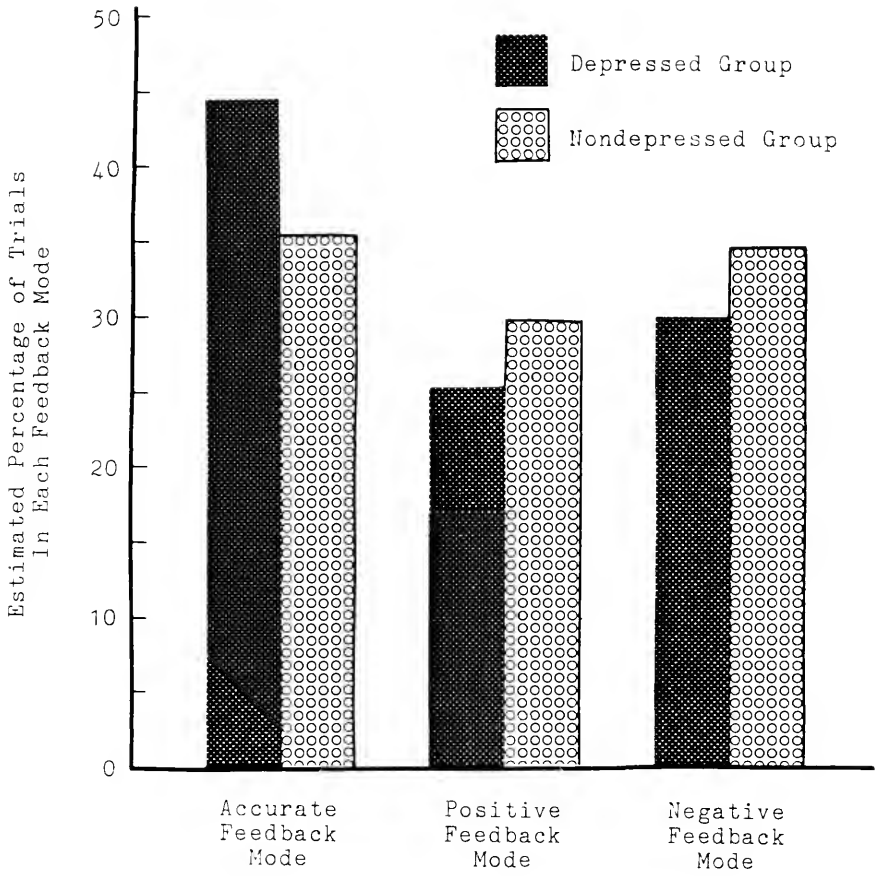


Figure 2. Comparison of depressed and nondepressed subjects' estimates of the percentage of trials the device was set in each of the three feedback modes.

Probability of the Bell Given a Correct Versus an Incorrect Response

Probability of the bell given a correct response.

Analysis of subjects' estimates of the probability that the bell would occur given a correct response (suggesting the presence of a contingent relationship) yielded significant main effects for group and task. Means and significance values for these effects are presented in Table 6 (complete results of this analysis are presented in Table E-4 of Appendix E).

The main effect for group indicates that depressed subjects reported significantly higher probabilities that the bell would occur given a correct response than did nondepressed subjects ($p < .01$). Further examination of the significant main effect for task, using post-hoc Duncan's comparisons, revealed significant differences across each of the three tasks ($p < .05$): Subjects gave the highest estimates that the bell would occur given a correct response on Task B, intermediate estimates on Task A, and the lowest estimates on Task C.

Probability of the bell given an incorrect response.

Analysis of subjects' estimates of the probability that the bell would occur given an incorrect response (suggesting the absence of a contingent relationship) yielded significant main effects for order and task, and

Table 6. Means and significance values for significant effects identified by analysis of subjects' estimates of the probability that the bell would occur given a correct response.

Effect	Mean	F	df	p
Group				
Depressed	54.150	7.22	1,72	.009
Nondepressed	47.542			
Task				
Task A	60.075			
Task B	64.963	145.74	2,144	.001
Task C	27.500			

a marginally significant group X order interaction. Means and significance values for these effects are presented in Table 7 (complete results of this analysis are presented in Table E-5 of Appendix E).

The significant main effect for order indicates that Order 1 subjects reported significantly lower probability estimates that the bell would occur given an incorrect response than did Order 2 subjects ($p < .003$). Further analysis of the significant main effect for task, using post-hoc Duncan's comparisons, revealed that subjects' estimates were significantly higher in Task B than in either Task A or C ($p < .05$); subjects' estimates were not significantly different in Tasks A and C.

Further analysis of the marginally significant group X order interaction using post-hoc LSD comparisons revealed that while depressed/Order 1 subjects gave significantly lower estimates than did depressed/Order 2 subjects ($p < .05$), nondepressed/Order 1 and nondepressed/Order 2 subjects did not differ significantly in their estimates. This finding suggests that the main effect for order, discussed above, may relate primarily to differences among the depressed subjects. The marginally significant group X order interaction is graphically depicted in Figure 3.

In order to gain a better understanding of the order effects identified on this measure, subjects' estimates were plotted separately for each group by order and task

Table 7. Means and significance values for significant and marginally significant effects identified by analysis of subjects' estimates of the probability that the bell would occur given the absence of a correct response.

Effect	Mean	F	df	p
Order				
Order 1	32.208	10.01	1,72	.002
Order 2	41.000			
Group X Order				
Depressed				
Order 1	28.533			
Order 2	42.683	3.72	1,72	.058
Nondepressed				
Order 1	35.883			
Order 2	39.317			
Task				
Task A	35.588			
Task B	42.475	4.61	2,144	.012
Task C	34.750			

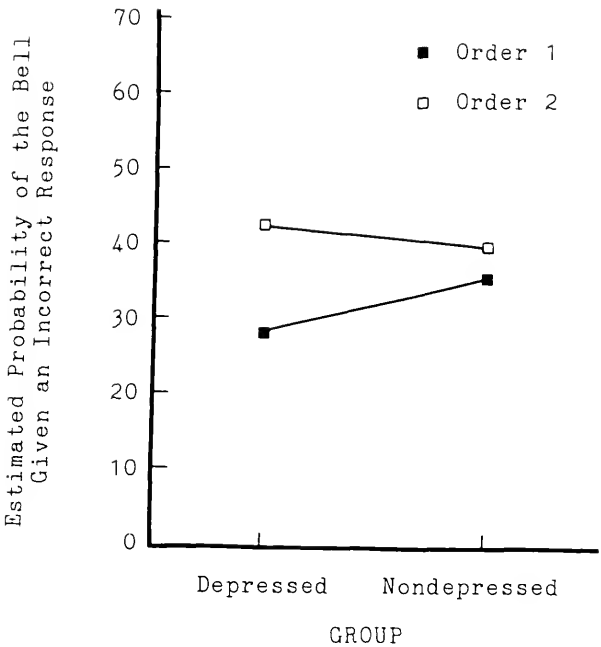


Figure 3. Subjects' estimates of the probability that the bell would occur given an incorrect response as a function of group and order.

(see Figure 4). This figure shows that while both depressed and nondepressed Order 2 subjects made higher estimates on Tasks B and C than did Order 1 subjects, the depressed/Order 2 subjects made particularly high estimates on Task C, and also on Task A, where no true order effect could occur (since subjects in both orders received this task first).

It may also be noted that while the main effect for group did not approach significance (F (1,72) = 0.51, p < .48), the depressed subjects did score in the direction of greater contingency perception, relative to the nondepressed subjects (means of 35.608, for the depressed group, and 37.600, for the nondepressed group). The group X order interaction, discussed above, indicates that this finding was particularly evident among Order 1 subjects.

Differential between subjects' probability estimates. Analysis of the difference between subjects' estimates of the probability of the bell given a correct versus an incorrect response yielded only a significant main effect for task. Means and significance values for this effect are presented in Table 8 (complete results of this analysis are presented in Table E-6 of Appendix E).

Further analysis of the significant main effect for task, using post-hoc Duncan's comparisons, revealed that subjects obtained smaller differences between the two probability estimates discussed above on Task C, relative to

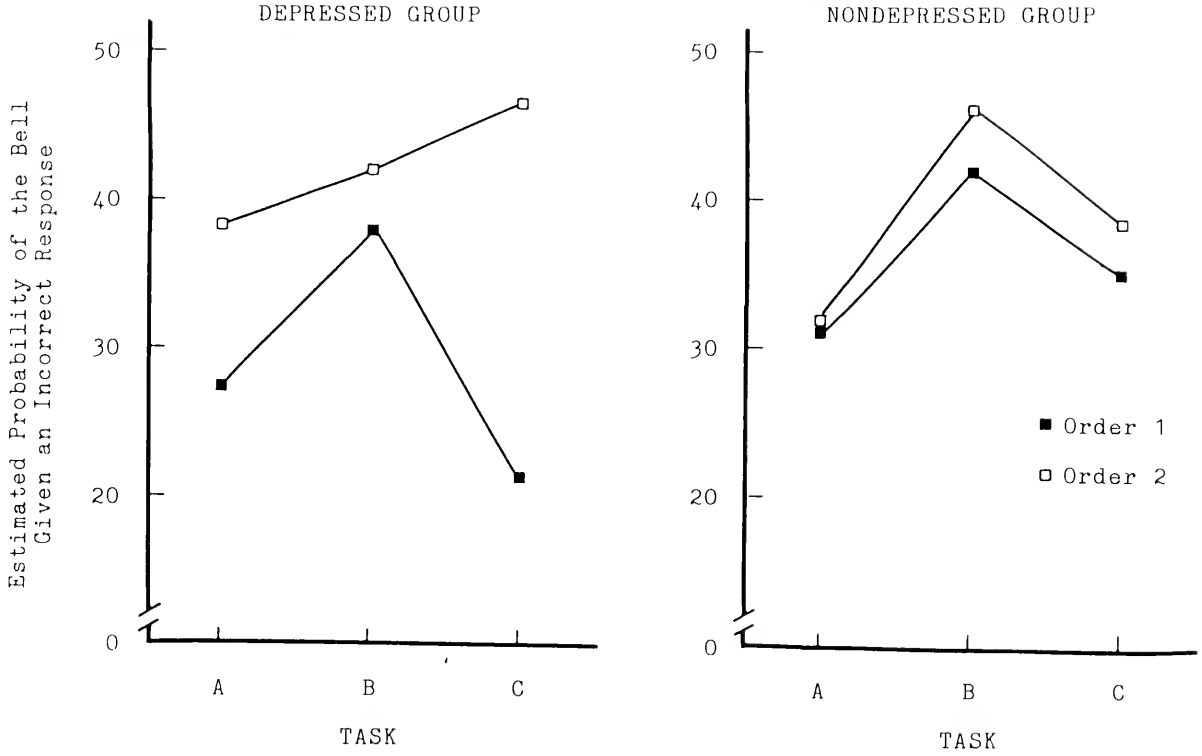


Figure 4. Subjects' estimates of the probability that the bell would occur given an incorrect response, as a function of group, order, and task.

Table 8. Means and significance values for the significant effect identified by analysis of the difference between subjects' estimates of the probability that the bell would occur given the presence versus the absence of a correct response.

Effect	Mean	F	df	p
Task				
Task A	30.888			
Task B	27.988	6.68	2,144	.002
Task C	19.550			

Tasks A and B ($p < .01$); subjects' probability differences did not differ between Tasks A and B.

It may again be noted that while the main effect for group did not approach significance (F (1,72) = 1.80, $p < .19$), the depressed subjects did score in the direction of greater contingency perception (means of 28.092, for the depressed group, and 24.192, for the nondepressed group).

Global Contingency Ratings

Analysis of subjects' global contingency estimates yielded only a significant main effect for task. Means and significance values for this effect are presented in Table 9 (complete results of this analysis are presented in Table E-7 of Appendix E).

Further analysis of the significant main effect for task, using post-hoc Duncan's comparisons, revealed that subjects reported less contingency in Task C than in either Task A or B ($p < .001$); subjects' ratings in Tasks A and B were not significantly different.

It may be noted, once again, that while the main effect for group did not approach significance (F (1,72) = 1.84, $p < .18$), depressed subjects did score in the direction of greater contingency perception (means of 51.658, for the depressed group, and 48.200, for the nondepressed group).

Table 9. Means and significance values for the significant effect identified by analysis of subjects' global contingency estimates.

Effect	Mean	F	df	p
Task				
Task A	56.912			
Task B	58.438	50.90	2,144	.001
Task C	34.438			

Interrelationships Among Subjects' Contingency Judgements.

The interrelationships among depressed and nondepressed subjects' contingency judgements were contrasted in order to test the suggestion that nondepressed subjects might evidence more distortions in the processing of their contingency judgements than would the depressed subjects. This was accomplished by computing Pearson product-moment correlations for each group, between subjects' global contingency ratings (assumed to reflect the greatest amount of cognitive processing) and all other contingency perception measures (assumed to reflect smaller amounts of cognitive processing). The results of this analysis are presented in Table 10.

The correlation patterns for depressed and nondepressed subjects were quite similar for Task A. For both depressed and nondepressed subjects, global contingency ratings were positively correlated with accurate feedback percent estimates ($p < .001$ and .01, respectively) and estimates of the probability that the bell would sound given a correct response ($p < .001$ for both groups), and negatively correlated with negative feedback percent estimates ($p < .001$ and .01, respectively). Nondepressed subjects had one additional significant correlation with the differential between the two probability estimates ($p < .05$)—this correlation approached significance amcng the depressed subjects ($p < .10$).

Table 10. Comparison of correlations between subjects' global contingency ratings and all other contingency perception measures for each group by task.

Contingency Perception Measure	Task A		Task B		Task C	
	DEP[a]	N-DEP[b]	DEP	N-DEP	DEP	N-DEP
Accurate Feedback Percent	.580***	.404**	.509***	.526***	.459**	.190
Positive Feedback Percent	-.229	-.151	-.452**	-.461**	-.161	.313*
Negative Feedback Percent	-.547***	-.438**	-.240	-.255	-.409**	-.353*
Probability of Bell Given Correct Response	.513***	.511***	.212	.276	.851***	.467**
Probability of Bell Given Incorrect Response	-.155	-.209	-.521***	-.154	.203	.061
Differential Between Probability Estimates	.310	.357*	.583***	.197	.043	-.092

Note. n = 40 for all correlations.

[a]Depressed group.

[b]Nondepressed group.

*$p < .05$.

**$p < .01$.

***$p < .001$.

On Task B, the global contingency ratings of both depressed and nondepressed subjects were positively correlated with their accurate feedback percent estimates ($p < .001$ for both groups) and negatively correlated with their positive feedback percent estimates ($p < .01$ for both groups). Additionally, the global contingency ratings of depressed subjects were negatively correlated with their estimates of the probability that the bell would occur given an incorrect response ($p < .001$) and positively correlated with the differential between the two probability estimates ($p < .001$); these correlations were not significant for nondepressed subjects.

On Task C, the global contingency ratings of both depressed and nondepressed subjects were negatively correlated with their negative feedback percent estimates ($p < .001$ and .05, respectively) and positively correlated with their estimates of the probability that the bell would occur given a correct response ($p < .001$ and .01, respectively). The global contingency ratings of the depressed subjects continued to correlate positively with their accurate feedback percent estimates ($p < .05$), as in the other two tasks, but this relationship did not hold for the nondepressed subjects. In fact, the global contingency ratings of nondepressed subjects were found to correlate positively with their positive feedback percent estimates ($p < .05$). Thus, nondepressed subjects' global contingency

ratings on Task C were uncorrelated with the amount of contingent feedback they recalled perceiving (accurate feedback percent estimate), but positively correlated with the amount of noncontingent positive feedback they recalled perceiving (positive feedback percent estimate).

Performance-Related Dependent Measures

Ability Estimates

Analysis of subjects' estimates of their ability on the word association task yielded significant main effects for sex and task. Means and significance values for these effects are presented in Table 11 (complete results of this analysis are presented in Table E-8 of Appendix E).

The significant main effect for sex indicates that males gave higher ability estimates than did females ($p < .03$). Further analysis of the main effect for task, using post-hoc Duncan's comparisons, revealed that subjects' ability estimates were significantly lower on Task C than on either Task A or B ($p < .001$); subjects' ability estimates were not significantly different in Tasks A and B.

It may also be noted that the main effect for group approached significance (F (1,72) = 3.16, $p < .08$), with depressed subjects tending to make lower ability estimates than those of the nondepressed subjects (means of 69.050 and 73.442, respectively). It was hypothesized that extended experience with the task might be serving to

Table 11. Means and significance values for significant effects identified by analysis of subjects' ability estimates.

Effect	Mean	F	df	p
Sex				
Males	74.092	5.31	1,72	.024
Females	68.400			
Task				
Task A	73.925			
Task B	73.425	8.56	2,144	.001
Task C	66.388			

obscure possible differences between depressed and nondepressed subjects' judgements of their abilities which are evident only when subjects have had less experience with a task. Subsequently, a separate analysis of subjects' ability estimates was conducted for only the initial task (Task A). This analysis yielded a highly significant main effect for group (F (1,72) = 8.09, $p < .006$), with depressed subjects making significantly lower ability ratings on this task than did the nondepressed subjects (means of 69.775, for the depressed group, and 78.075, for the nondepressed group).

Concerns were expressed earlier that there might be a direct relationship between subjects' ability estimates and their judgements of contingency. This concern was addressed by calculating Pearson product-moment correlations between subjects' ability estimates and each of the contingency perception measures for each of the three tasks. The results of this analysis are presented in Table 12. It reveals only two statistically significant, but weak, correlations, both on Task B. It may be noted that the direction of these two significant correlations was in the opposite direction to that which was hypothesized to suggest that subjects' contingency judgements were influenced by their ability estimates.

Table 12. Correlations between subjects' ability estimates and all contingency perception measures by task.

Contingency Perception Measures	TASK		
	Task A	Task B	Task C
Accurate Feedback Percent	-.138	.057	.124
Positive Feedback Percent	-.019	-.027	.084
Negative Feedback Percent	.200	-.081	-.170
Probability of Bell Given Correct Response	.032	.254*	.180
Probability of Bell Given Incorrect Response	-.037	.184	.048
Differential Between Probability Estimates	.084	.115	.031
Global Contingency Ratings	.038	.265*	.204

Note. n = 80 for all correlations.

*$p < .05$.

Control Estimates

Analysis of subjects' estimates of the degree of control they had over the outcomes they received during the tasks yielded only a significant main effect for task. Means and significance values for this effect are presented in Table 13 (complete results obtained from this analysis are presented in Table E-9 of Appendix E).

Further analysis of the significant main effect for task, using post-hoc Duncan's comparisons, indicated that subjects reported experiencing significantly different degrees of control in each of the three tasks ($p < .01$): Subjects reported experiencing the greatest degree of control in Task B, an intermediate degree of control in Task A, and the least amount of control in Task C.

Recall of Positive Outcomes

The two parts of the question asking subjects to recall the number of positive and negative outcomes they received on the tasks were considered to provide redundant information, since either response should correspond to the difference between the other response and 32. Thus, it was decided to analyze only subjects' recall of positive outcomes. However, a check of subjects' responses revealed that 4 of the 240 pairs of responses to this question did not sum to 32, presumably due to subjects' forgetting that the two parts should add to 32 and/or their

Table 13. Means and significance values for the significant effect identified by analysis of subjects' control estimates.

Effect	Mean	F	df	p
Task				
Task A	47.525			
Task B	55.888	23.21	2,144	.001
Task C	35.688			

miscalculating the total of their estimates (these four pair of responses totaled to 23, 30, 31, and 35). In order to compensate for these errors, the scores from these four pair were adjusted so that the two parts actually did total to 32. This was accomplished by dividing the positive recall estimate by the total of the two estimates and then multiplying by 32.

Analysis of subjects' recall of the number of positive outcomes they received yielded significant main effects for sex and task, and a significant group X order X task interaction. Means and significance values for these effects are presented in Table 14 (complete results of this analysis are presented in Table E-10 of Appendix E).

The significant main effect for sex indicates that males recalled a significantly greater number of positive outcomes than did females ($p < .03$). Examination of the mean estimates for each sex for each of the three tasks revealed that females' estimates were more accurate than males': Means, in order from Task A to Task C, were 17.212, 23.465, and 8.305 for females, and 18.725, 23.080, and 10.050 for males (versus actual values of 16, 24, and 8).

Interpretation of the significant main effect for task must be made in light of the significant group X order X task interaction. Further analysis of this triple interaction was accomplished by conducting separate group X order ANOVA's for each task. No significant group X order

Table 14. Means and significance values for significant effects identified by analysis of subjects' recall of positive outcomes.

Effect	Mean	F	df	p
Sex				
Males	17.285	4.98	1,72	.029
Females	16.327			
Task				
Task A	17.968			
Task B	23.273	405.00	2,144	.001
Task C	9.177			
Group X Order X Task				
Task A				
Depressed				
Order 1	18.450			
Order 2	17.450			
Nondepressed				
Order 1	18.174			
Order 2	17.800			
Task B				
Depressed				
Order 1	23.700			
Order 2	22.810			
Nondepressed		3.56	2,144	.030
Order 1	23.880			
Order 2	22.700			
Task C				
Depressed				
Order 1	7.410			
Order 2	10.150			
Nondepressed				
Order 1	10.400			
Order 2	8.750			

interactions were detected in Task A (F (1,76) = 0.20, ns) or Task B (F (1,76) = 0.05, ns), but a significant group X order interaction was observed in Task C (F (1,76) = 7.20, $p < .01$). Further analysis of this significant interaction on Task C, using post-hoc LSD comparisons, revealed that depressed/Order 1 subjects recalled significantly fewer positive outcomes than did depressed/Order 2 subjects ($p < .05$) or nondepressed/Order 1 subjects ($p < .05$). No differences were noted between nondepressed/Order 1 and nondepressed/Order 2 subjects, or between depressed/Order 2 subjects and nondepressed/Order 2 subjects. The significant group X order interaction on Task C is graphically depicted in Figure 5.

The above analysis revealed a similar pattern of performance for all groups across the three tasks, allowing for straightforward interpretation of the significant main effect for task. Post-hoc Duncan's comparisons revealed significant differences between subjects' estimates for each of the three tasks ($p < .001$). Subjects recalled the greatest number of positive outcomes on Task B, and intermediate number on Task A, and the smallest number on Task C. It may also be noted that subjects were generally quite accurate in their estimates of the number of positive outcomes received: an estimate of 17.968, versus the actual number of 16, on Task A; an estimate of 23.273, versus the actual number of 24, on Task B; and an estimate of 9.177, versus the actual number of 8, on Task C.

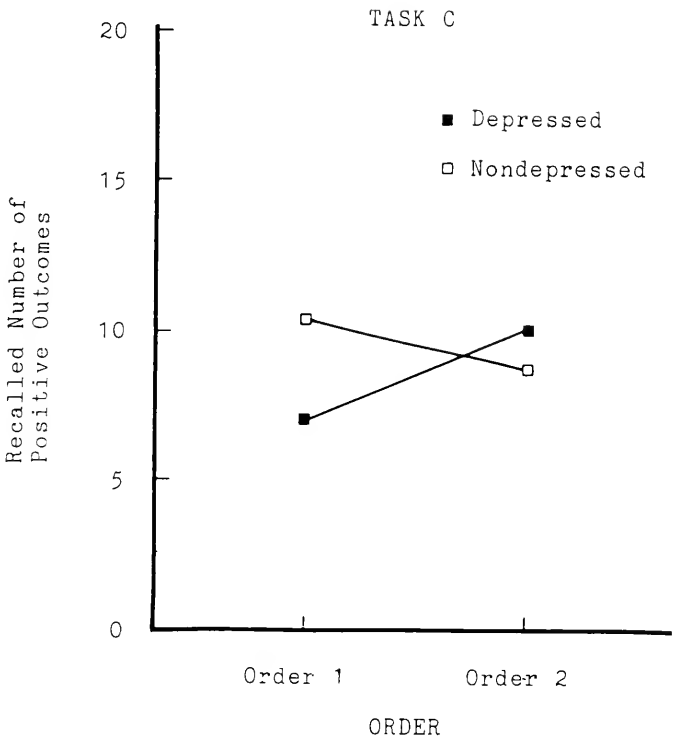


Figure 5. Subjects' recall of positive outcomes on Task C as a function of group and order.

Number of Correct Attempts

The two parts of the question asking subjects to estimate the number of correct and incorrect attempts that they made during the tasks were also considered to contain redundant information (like the two parts of the question relating to the recall of positive and negative outcomes). Subsequently, only the estimates relating to the number of correct attempts were examined. As with the recall measure, however, four of the 240 pair of responses were found not to sum to 32 (three of these summed to 33 and one summed to 30). These four estimates were adjusted in the same manner as were the recall estimates so that the two parts actually totalled to 32.

Analysis of subjects' recall of the number of correct attempts they made during the tasks yielded a significant main effect for group, a significant group X task interaction, and a marginally significant group X sex X order interaction. Means and significance values for these effects are presented in Table 15 (complete results of this analysis are presented in Table E-11 of Appendix E).

Interpretation of the significant main effect for group must be made in light of the significant group X task interaction. Further analysis of this interaction, using post-hoc Duncan's comparisons, revealed that depressed subjects recalled making more correct attempts than did nondepressed subjects on Tasks B and C ($p < .05$), but that they

Table 15. Means and significance values for significant and marginally significant effects identified by analysis of subjects' recalled number of correct attempts.

Effect	Mean	F	df	p
Group				
Depressed	24.004	8.63	1,72	.004
Nondepressed	21.347			
Group X Task				
Depressed		4.53	2,144	.012
Task A	23.350			
Task B	24.636			
Task C	24.025			
Nondepressed				
Task A	22.925			
Task B	19.641			
Task C	21.475			
Group X Sex X Order				
Depressed		3.89	1,72	.053
Male				
Order 1	22.632			
Order 2	23.667			
Female				
Order 1	25.067			
Order 2	24.649			
Nondepressed				
Male				
Order 1	23.900			
Order 2	20.067			
Female				
Order 1	19.788			
Order 2	21.633			

did not differ on Task A. This analysis also revealed that nondepressed subjects reported fewer correct attempts on Task B than on Task A ($p < .05$), whereas depressed subjects showed no significant differences across the three tasks. The significant group X task interaction is graphically depicted in Figure 6.

Separate group X sex ANOVA's were conducted for each order for the purpose of examining the marginally significant group X sex X order interaction which is graphically depicted in Figure 7. For Order 1, a significant group X sex interaction was found (F (1,36) = 9.31, $p < .01$). Further analysis of this interaction, using post-hoc LSD comparisons, revealed that nondepressed females recalled fewer positive efforts than did nondepressed males ($p < .05$) or depressed females ($p < .01$). No significant differences were noted for Order 1 between depressed males and females or between depressed and nondepressed males. The ANOVA for Order 2 yielded a significant main effect for group (F (1,36) = 9.57, $p < .01$), but a nonsignificant group X sex interaction (F (1,36) = 0.08, ns). Post-hoc LSD comparisons for Order 2 revealed that depressed males reported significantly more positive efforts than nondepressed males ($p < .05$), while depressed females tended to make more positive efforts than nondepressed females ($p < .10$). No significant differences were noted for Order 2 between depressed males and females or between nondepressed males and females.

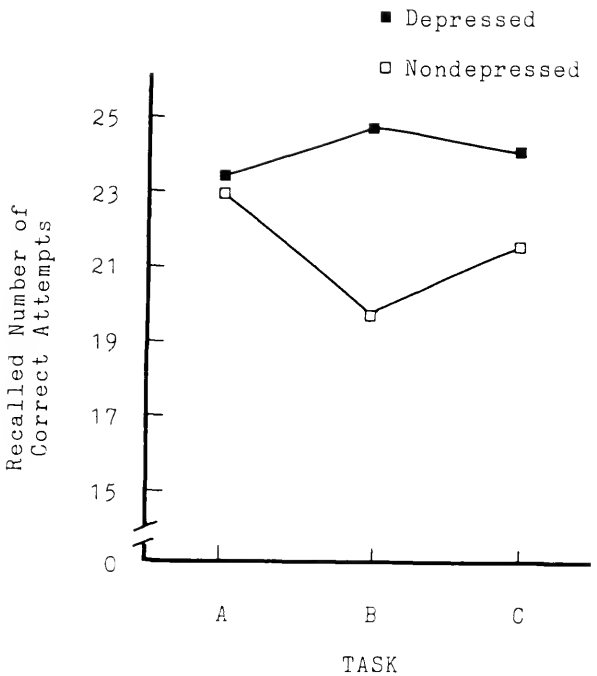


Figure 6. Subjects' recalled number of correct attempts as a function of group and task.

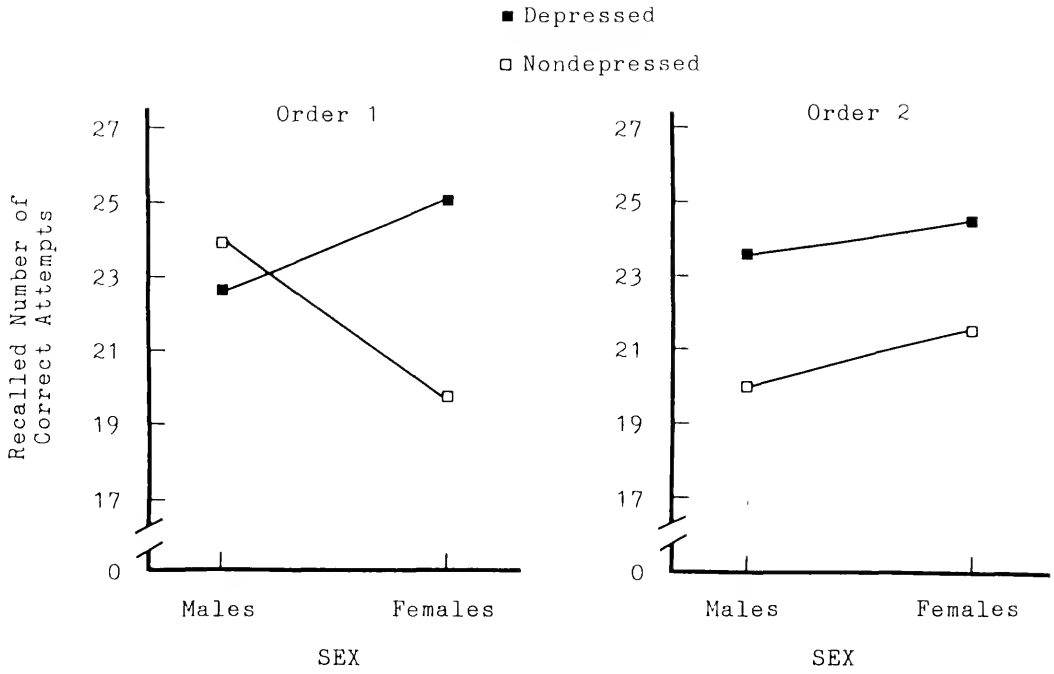


Figure 7. Subjects' recalled number of correct attempts as a function of group, sex, and order.

Inspection of the mean scores for the marginally significant group X sex X order interaction, discussed above, suggested that any sex X order interactions were specific to the nondepressed subjects. The results obtained from separate sex X order ANOVA's conducted for each group confirmed this suggestion: The sex X order interaction was not significant for depressed subjects (F (1,36) = 0.38, ns), but it was significant for nondepressed subjects (F (1,36) = 7.94, p < .01). Post-hoc LSD comparisons revealed that Order 1/nondepressed/males reported more positive efforts than either Order 2/nondepressed/males (p < .05) or Order 1/nondepressed/females (p < .01). No other significant differences were noted for the nondepressed subjects.

Finally, concerns were expressed earlier that variations in subjects' approach to the word association task (i.e., the number of correct versus incorrect attempts that they made) might influence their contingency judgements by altering the amount of confirming versus disconfirming feedback that they received on the tasks. This concern was addressed by calculating Pearson product-moment correlations to assess the relationship between subjects' contingency judgements and the number of correct attempts that they reported making. The results of this analysis are presented in Table 16. They reveal that the number of positive efforts reported by subjects were

Table 16. Correlations between subjects' recalled number of correct attempts and their ratings on all contingency perception measures.

Contingency Perception Measures	TASK		
	Task A	Task B	Task C
Accurate Feedback Percent	.267*	.401***	-.051
Positive Feedback Percent	-.220	-.316**	-.206
Negative Feedback Percent	-.173	-.282*	.181
Probability of Bell Given Correct Response	.250*	.280*	-.184
Probability of Bell Given Incorrect Response	-.177	-.351**	-.262*
Differential Between Probability Estimates	.254*	.244*	-.106
Global Contingency Rating	.175	.389***	-.215

Note. n = 80 for all correlations.

*$p < .05$.

**$p < .01$.

***$p < .001$.

significantly correlated with two of the seven contingency perception measures in Task A, with all seven measures in Task B, and with only one of the measures in Task C. All of the significant correlations were in the direction which indicated that greater numbers of positive efforts were associated with the perception of greater amounts of contingency.

CHAPTER FOUR
DISCUSSION

The primary findings of the current research relate to the identification of differences in the contingency perception tendencies of depressed and nondepressed subjects; these findings will be discussed in detail below. The current research also yielded a number of additional findings which will be more briefly considered following full discussion of the primary findings (e.g., findings relating more generally to the perception of contingency process, findings relating to other differences between depressed and nondepressed subjects, etc.). Following the discussions described above, concluding comments and suggestions for future research will be presented.

Differences Between Depressed and Nondepressed Subjects' Contingency Perception Tendencies

Review and Discussion of Major Findings

Depressed subjects, relative to nondepressed subjects, scored in the direction of greater contingency perception on all seven of the contingency perception measures, obtaining significantly higher ratings of contingency on four of the seven measures, and considerably greater than

chance differences on two of the three remaining measures ($p < .19$). Depressed subjects also reported classifying significantly more of the outcomes they received as contingent events than as either positive noncontingent or negative noncontingent events; this pattern was not obtained for nondepressed subjects who classified an equal number of outcomes as contingent events and as noncontingent negative events.

Overall, the above findings strongly suggest that depressed subjects are more prone to perceive contingency between their responses and subsequent outcomes than are nondepressed subjects. It is particularly noteworthy that there were no group X task interactions across any of the contingency perception measures, indicating that depressed subjects perceived a greater degree of contingency than did nondepressed subjects across all three of the experimental tasks. This finding suggests that the heightened contingency perception tendencies of depressives are independent of outcome valence and frequency. This conclusion is made somewhat less definitive, however, by a confound on Task B between subjects' contingency judgements and the number of correct attempts that they made on the task (this confound will be discussed in detail below).

The heightened contingency perception of the depressed subjects was particularly evident on the measures assumed to provide the most direct access to subjects' trial-by-

trial contingency judgements (i.e., on the measures simply asking subjects to recall the percentage of outcomes they classified in each of the three ways) than on those measures assumed to also reflect additional cognitive processing of these judgements (i.e., on the measures asking subjects to estimate the probability of the bell given a correct or an incorrect response, and on the measure asking subjects to make global ratings of the degree of relationship between their responses and the occurrence of the outcomes). This finding indicates that the differences between depressed and nondepressed subjects' contingency perception tendencies are most pronounced in their judgements of ambiguous, single-occurrence events (or, at least in their recall of these judgements), and that these differences are obscured on measures which also reflect additional cognitive processing of these judgements.

The current findings also suggest that it may primarily be distortions in nondepressed subjects' processing of their contingency judgements that account for the obscuring of the group differences in contingency perception when additional cognitive processing is involved. This is reflected by the finding that depressed subjects obtained more numerous, more consistent, and generally more robust correlations between their global contingency ratings (which were considered to reflect the greatest amount of cognitive processing) and their other contin-

gency judgements (assumed to reflect smaller amounts of additional cognitive processing) than did the nondepressed subjects. The nondepressed subjects' distortions were particularly evident on Task C where, for the first time for either group, their global contingency ratings failed to correlate with their accurate feedback percent estimates (reflecting the amount of contingent feedback they perceived), and, instead, they were positively correlated with their positive feedback percent estimates (reflecting the amount of noncontingent positive feedback they perceived). This finding suggests that nondepressed subjects' processing of contingency judgement information may be particularly distorted under aversive conditions.

There was also a marginally significant group X order interaction on the measure assessing subjects' estimates of the probability that the bell would occur given an incorrect response. This interaction indicated that Order 2/depressed subjects made particularly high ratings on this measure. This finding appears attributable, at least in part, to factors other than task order, since it was also observed on Task A where no true order effects could occur (since all subjects received this task first). Overall, the ratings of the Order 2/depressed subjects on this measure are difficult to explain: They present a strikingly different pattern of estimates than do all other groups, giving the high ratings on Task A and also giving

extremely high ratings on Task C. This last finding is also difficult to account for, since the characteristics of this task (low frequency of positive outcomes) would not be expected to result in high ratings on this measure. These peculiarities of the Order 2/depressed subjects' performance on this measure raise the possibility that these subjects misinterpreted the measure in some manner that encouraged higher estimates; this suggestion is supported by the fact that comparable order effects were not found on any other contingency perception measure.

Given the possibility that Order 2/depressed subjects may have misinterpreted this measure in some manner, it is particularly noteworthy that Order 1/depressed subjects' judgements followed the same pattern across the three tasks as did those of the nondepressed subjects' (suggesting that they interpreted the measure in the same manner), but that their estimates were consistently lower, indicating greater contingency perception. Thus, if it were the case that Order 2/depressed subjects misinterpreted this measure in some manner, and that their ratings should subsequently be disregarded, then the remaining results would indicate greater contingency perception for the depressed subjects.

Discussion of Possible Methodological Confounds

Concerns were expressed earlier that subjects' contingency judgements might be directly influenced by their judgements of their ability to perform the word association task and/or by the number of positive efforts that they made. Such relationships, if they were found to be present, would raise the possibility that the obtained group differences on the contingency perception measures might be accounted for by variations in these two variables, rather than being reflective of true differences in these subjects' contingency perception tendencies. The findings relating to each of these concerns are discussed below.

The concern that subjects' contingency judgements might be influenced by their ability judgements was found to be unsubstantiated. Subjects' ability estimates were significantly correlated with only two contingency perception measures on only one of the three tasks (Task B)—and the direction of these relationships was opposite to what would be expected if subjects' ability estimates influenced their contingency judgements. Specifically, it had been expected that such a causal relationship would result in lower contingency judgements for subjects who rated themselves as having high ability on the task; this was predicted because it was felt that these subjects would be more prone to interpret feedback that was

incongruent with their expectations as being noncontingent (as opposed to concluding that their expectation had been incorrect). In fact, high ability estimates were positively correlated with higher contingency judgements on Task B. This finding suggests that any causal relationship between these variables would indicate that subjects' contingency judgements influenced their ability estimates, rather than the reverse (i.e., subjects who perceived the positive feedback of Task B to be contingent may have been relatively more strongly influenced by this feedback to make higher ability estimates than those subjects who perceived the feedback to be less contingent). The above findings indicate that the heightened contingency perceptions of the depressed subjects cannot be accounted for by their marginally significant tendency to give lower ability estimates than did the nondepressed subjects.

The second concern referred to above was that subjects' contingency judgements on Tasks B and C might be influenced by variations in the number of positive efforts that they made on these tasks, because of the impact these variations would have on the relative amounts of confirming versus disconfirming feedback that subjects received. This concern was found to be unsubstantiated for Task C. Only one significant correlation was obtained on this task between subjects' contingency judgements and the number of positive efforts that they made, and this

relationship was in the opposite direction of what would be expected if their contingency judgement was influenced by the number of positive efforts that they made. Specifically, it would be expected that increasing numbers of positive efforts on this task would result in lower contingency judgements by increasing the amount of disconfirming feedback received; instead, the obtained correlation showed a positive relationship between subjects' contingency judgements and the number of positive efforts that they made.

It is considerably more difficult, however, to discount the possibility that subjects' contingency judgements on Task B were influenced by the number of positive efforts that they made. Moderately strong correlations were obtained on this task between the number of positive efforts subjects reported making and all seven on the contingency perception measures—and the direction of all of these relationships was that which would be expected if subjects' contingency judgements had been influenced by their approach to the task. Additionally, it may be recalled that depressed subjects were found to report making more positive efforts than nondepressed subjects on this task. These findings raise the possibility that the higher contingency judgements of depressed subjects on this task, relative to those of the nondepressed subjects, might simply be reflective of their differing approaches

to the task (and the resulting changes in the amount of confirming versus disconfirming feedback received), rather than being truly reflective of a tendency toward greater contingency perception among the depressed subjects. Although it is not possible to totally discount this possibility on the basis of the current findings, the overall pattern of results regarding the relationship between subjects' contingency perception tendencies and the number of positive efforts that they made suggests that this finding can be, at least partially, accounted for in another manner.

Examination of the correlations between subjects' contingency judgements and the number of positive efforts that they made on each of the three tasks reveals that higher contingency judgements were positively correlated with increasing numbers of positive efforts regardless of their impact upon the amount of confirming versus disconfirming feedback received. On Task A, for example, where subjects' approach to the task should not have influenced the amount of confirming versus disconfirming feedback received, three significant positive correlations were still observed between these variables. Similarly, on Task C, it was noted above that the lone significant correlation between subjects' contingency judgements and the number of positive efforts they reported making was a positive one, indicating that higher contingency judgements

on this measure were given by subjects who actually should have received greater amounts of disconfirming feedback. Thus, these findings indicate that subjects who tend to make greater numbers of positive efforts on these tasks also tend to perceive greater amounts of contingency, even when this approach to the task does not influence the amount of confirming versus disconfirming feedback received, or even where it actually increases the amount of disconfirming feedback received. This suggests that the high correlations obtained on Task B may exaggerate the magnitude of any possible influence that subjects' approach to the task had upon their contingency judgements, since the variables involved here tend to be positively correlated regardless of such influences.

Taken together, the above findings suggest that there may be two relatively independent relationships which exist between the number of positive efforts subjects make and their subsequent contingency judgements. There appears to be a broad, nonspecific relationship which extends across all tasks and indicates that those subjects who tend to perceive greater amounts of contingency also tend to make greater numbers of positive efforts on the tasks. There also appears to be a more limited, task-specific relationship which reflects the impact subjects' approach to the task has upon their contingency judgements via its influence upon the amount of confirming versus disconfirm-

ing feedback received. When only the general relationship is assessed, as in Task A, a weak positive relationship is observed between the two variables. When the general effect and the task-specific effect are in the same direction, as in Task B, a relatively powerful positive relationship is observed. Finally, when the general and task-specific effects are in opposite directions, as in Task C, weak and inconsistent correlations are the result, with the strongest effects being in the direction of the general effect.

Overall, then, one is left with the possibility that the contingency judgement ratings of the depressed subjects may be somewhat inflated on Task B, relative to those of the nondepressed subjects, due to the differing amounts of confirming and disconfirming feedback they received as a result of their differing approaches to the task. However, it appears that the magnitude of the impact these differing approaches had upon subjects' contingency judgements is exaggerated by the obtained correlations since these variables tend to be correlated regardless of their impact upon the amount of confirming versus disconfirming feedback received. Similarly, it might also be suggested that the magnitude of depressives' contingency perception tendencies may have been underestimated on Task C, since depressed subjects' approach to this task should have resulted in greater amounts of disconfirming

feedback than that of the nondepressed subjects. In any event, it must be recognized that depressed subjects did perceive greater amounts of contingency than nondepressed subjects at all reinforcement levels when subjects were allowed to approach the task in whatever manner they chose. It should also be noted that depressed subjects perceived greater amounts of contingency than did the nondepressed subjects on Task A where the two groups did approach the task in the same manner. Overall, then, it seems reasonable to conclude that depressed subjects perceived more contingency than nondepressed subjects at all reinforcement levels, but it remains unclear whether this finding would be maintained under conditions where both groups made equal numbers of correct attempts while receiving high frequency positive feedback.

Integration of the Current Findings with Prior Research

The current findings relating to the differences between the contingency perception tendencies of depressed and nondepressed subjects are in direct opposition to the central contention of the LH model: Depressed subjects were found to be more prone to perceive contingency between their responses and subsequent outcomes than were nondepressed subjects, not less prone as predicted by this model. Instead, this finding is more consistent with traditional self-blame models of depression (e.g., Beck,

1967) and with prior attributional findings indicating that depressed subjects are more prone to assume responsibility for events ocurring in the world around them than are nondepressed subjects (e.g., Kuiper, 1978; Rizley, 1978). In particular, the current findings parallel those of Kuiper who found that depressed subjects were more prone to accept responsibility for both evaluatively positive and negative events than were nondepressed subjects. These findings also serve to resolve the apparant paradox in depressive symptomology, discussed by Abramson and Sackeim (1977), regarding the logical inconsistency of depressed subjects' displaying both a tendency to blame themselves for outcomes (as indicated by attributional findings such as those mentioned above, plus clinical observations of depressed subjects) and a tendency to perceive outcomes as being noncontingently determined: The current findings indicate that depressed subjects do not evidence a tendency to perceive outcomes as being noncontingent.

It is rather difficult to compare the current findings with those of Alloy and Abramson (1979) because of the marked differences in the conceptualization of the contingency judgement process and in the procedures employed for assessing subjects' contingency perception tendencies in the two studies. However, there do appear to be at least two similarities in the two sets of findings. First, both sets of findings indicate that depressed

subjects tend to perceive greater amounts of contingency than do nondepressed subjects under aversive conditions. Second, both sets of findings may be interpreted to indicate that depressed subjects are less susceptible to biases and distortions in the processing of contingency judgement information than are nondepressed subjects. The primary difference in the two sets of findings concerns the overall pattern of contingency perception presented by the two groups in the two studies. The current findings showed depressed subjects to give higher contingency ratings than nondepressed subjects across all reinforcement conditions; in contrast, Alloy and Abramson's (1979) findings indicated group differences which varied considerably depending upon outcome valence and frequency (e.g., nondepressed subjects perceived more contingency than depressed subjects under positive conditions, but less contingency than depressed subjects under negative conditions).

There are several possible explanations for the differences between the current findings and those of Alloy and Abramson. First, as noted above, the failure to find higher contingency ratings among the nondepressed subjects for the high reinforcement condition (Task B) might be related, in part, to the differing approaches of the depressed and nondepressed subjects toward the task, resulting in nondepressed subjects' receiving greater amounts of disconfirming feedback than the depressed subjects.

Alternately, this difference, plus all the other differences mentioned above, may indicate that the procedural changes made for the current research were successful in providing a more valid measure of subjects' contingency perception tendencies than that provided in the Alloy and Abramson procedures. Thus, it may be that the current findings are more reflective of subjects' contingency perceptions for ambiguous, single-occurrence events, whereas the Alloy and Abramson findings may only be reflective of subjects' processing of contingency judgement information. It might also be that the more variable pattern obtained by Alloy and Abramson is more reflective of subjects' misinterpreting their tasks as relating to issues of efficacy and control, whereas the current findings are more reflective of actual contingency perception tendencies. Each of these suggestions will be discussed in more detail below.

The suggestion the the current findings may be more representative of subjects' contingency judgements for ambiguous, single-occurrence events is supported by the finding that the group differences were most pronounced on the measures assumed to most directly address these judgements, as opposed to those measures assumed to also reflect additional cognitive processing of these judgements. Interestingly, the current findings also supported the proposed reinterpretation of the Alloy and Abramson findings, along these lines, as being indicative of subjects' accuracy

in the processing of contingency judgement information, rather than as being truly reflective of contingency perception biases: The current findings showed that depressed subjects' judgements of contingency were more strongly correlated at different levels of processing than were those of nondepressed subjects, suggesting that depressed subjects introduce fewer distortions into their cognitive processing than do nondepressed subjects.

Only tangential support was provided for the suggestion that the current results may be more reflective of subjects' contingency perception tendencies, whereas those of Alloy and Abramson may be more concerned with issues of efficacy and control. While consistent group differences were obtained on the contingency perception measures for the current research, no group differences were obtained for the control measure which, instead, closely reflected the reinforcement frequencies on each task. These findings indicate that the current procedure was effective in separating subjects' contingency and control judgements, and they support the suggestion, made earlier, that subjects' control judgements should be highly related to reinforcement frequencies.

It is rather surprising the the current findings differed so markedly from those of Miller (Note 1), since the procedures employed in the two studies were closely related. These differences may be attributable to the

procedural difficulties discussed earlier in regard to Miller's study: the post-hoc identification of the high-depressed sub-group and/or the confound between the perception of noncontingency and stopping earlier on the task. These differences might also be reflective of a subtle procedural difference in the two studies. It may be noted that while Miller's assessment procedure did not overtly confound subjects' contingency and control judgements (i.e., he did not ask subjects to rate the amount of "control" that they had exerted on the tasks), the task itself was structured in such a way that it may have inadvertantly made the issue of control much more salient than in the current procedure. Specifically, Miller's instructions to subjects stated that their "basic task" was "to select . . . the response given by most . . . subjects as an associate to the stimulus word" (p. 77). In the current instructions, much more emphasis was placed upon the perception of contingency process rather than upon the identification of the correct word association choices, and subjects were even given permission to deliberately attempt wrong answers if they wished. The overall result of these procedural differences would seem to be to emphasize the identification of appropriate controlling responses much more strongly in Miller's procedure than in the present procedure. Thus, it may be that Miller's findings are reflective of the same phenomenon observed

in the Alloy and Abramson study: Depressed subjects may have concentrated more upon the perception of contingency process in this procedure, whereas the nondepressed subjects may have concentrated more upon the identification of appropriate controlling responses (causing them to continue longer in the task before recognizing the noncontingent nature of the feedback they were receiving).

Review and Discussion of Other Findings

Differences Between Depressed and Nondepressed Subjects' Responses on the Performance-Related Measures

The differences between depressed and nondepressed subjects' estimates of their ability on the word association task only approached significance, with depressed subjects tending to make lower estimates of their ability than did the nondepressed subjects. The finding that depressed subjects tended in this direction is not surprising. This finding is consistent with prior research demonstrating that depressed subjects generally give lower estimates of their ability on skill tasks than do nondepressed subjects (e.g., Loeb, Beck, & Diggory, 1971; Golin, Terrell, & Johnson, 1977). It is somewhat surprising, however, that this difference did not actually reach statistical significance. As suggested earlier, this seems attributable at least in part to the influence of experience with the task, which served to minimize group

differences beyond the intial task where these differences were the most pronounced. It is interesting that the correlational analyses did not show a substantial correlation between subjects' ability estimates and their contingency judgements. This finding may indicate that subjects' contingency perception tendencies are relatively independent of their judgements of their capacity to perform appropriate controlling responses. However, the failure to observe a strong relationship between these variables may be attributable to the influence of the same task effects referred to above, making subjects' ability estimates a poor measure of their tendencies to assume that they either are, or are not, able to perform appropriate controlling responses.

Interestingly, there were no group differences in subjects' estimates of the degree of control they were able to exert over the outcomes they received in the tasks. This finding was somewhat unexpected, since it had been argued earlier that previously observed differences in depressed and nondepressed subjects' "contingency judgements" might actually be more reflective of differences in their judgements of control. The failure to find group differences here may also (as with the ability measure) be attributed to the powerful influence of the task itself, serving to overshadow underlying group differences. Alternately, it may be that the current procedures successfully

de-emphasized the issue of control, relative to that of contingency, to the extent that any group differences along these lines were not manifested—it may be that group differences in the tendency to perceive control may be evidenced only under conditions where such control is emphasized and, subsequently, sought by subjects. At any rate, the failure to find group differences in subjects' control judgements, in contrast to the significant contingency perception differences, demonstrates that the current procedure successfully separated subjects' contingency and control judgements.

It was also somewhat surprising that there were no group differences in subjects' recall of the number of positive outcomes they received (except for the significant group X order interaction on Task C), since prior research has found that nondepressed subjects typically overestimate the amount of positive feedback they receive, relative to depressed subjects (e.g., Nelson & Craighead, 1977). It might be considered that the failure to find this effect was partially attributable to the reduction in the variability of the estimates due to the relatively small number of trials in each task and/or to the fact that subjects were specifically reminded of the total number of trials in each task. This explanation appears largely untenable, however, since other significant effects were obtained on this measure (e.g., a main effect for sex). It

may also be that this type of group difference is evidenced only under conditions where subjects are actively striving to obtain desired outcomes. This suggestion receives some support from an examination of the significant group X order interaction observed on Task C.

The significant group X order interaction on Task C indicates that nondepressed subjects did overestimate the amount of positive feedback they received on this one task, when they received it last, but not when they received it second. This finding indicates that nondepressed subjects may be more likely to overestimate the amount of positive feedback they receive under conditions in which they have had a history of receiving high-frequency positive outcomes, but are now receiving low-frequency positive outcomes. The history of high-frequency positive outcomes followed by low-frequency positive outcomes may have suggested to the subjects that they had lost the capacity to control an outcome that they had previously controlled, subsequently creating a greater threat to subjects' sense of self-esteem than in the condition in which they received the same low-frequency positive outcomes, but without the history of experiencing control over these outcomes. The finding that only nondepressed subjects displayed distortions under these conditions may indicate either that they were more prone to interpret these events as indicating a loss of control than were depressed subjects and/or that they were more

strongly influenced by this interpretation to distort their recall in a positive direction (perhaps because they were more motivated to protect self-esteem than were the depressed subjects).

Finally, the significant differences in depressed and nondepressed subjects' approach to the task, with the depressed subjects making greater numbers of positive efforts on Tasks B and C (except for Order 1/males), were largely unexpected, and quite intriguing. In a general sense, these findings seem consistent with the finding that depressed subjects perceived greater amounts of contingency on the tasks: To the extent that a subject feels relatively confident that the feedback he is receiving is contingent, there is less need to deviate from a more standard approach to tasks (characterized by efforts to give the correct response) in order to determine the degree of contingency that is present. Alternately, it may be suggested that it requires greater effort to deliberately attempt wrong answers, and that depressed subjects' decreased reliance upon this approach may better be explained in motivational terms. In this regard, this finding could be related to Alloy and Abramson's (1979) interpretation of the finding that depressed subjects attempted fewer complex hypotheses during their contingency perception tasks as being indicative of a motivational deficit (it may be recalled, however, that an alternate interpre-

tation of this finding was presented earlier: that nondepressed subjects engaged in greater amounts of complex hypothesis testing than did the depressed subjects because they interpreted their task more as one of identifying the appropriate controlling response, rather than as one of judging the degree of contingency that was present). At any rate, it may be said that depressives' approach to the various tasks was characterized by rigidity and an insensitivity to the varying feedback patterns that they received. It remains unclear, however, what the causes or consequences of this rigid approach might be, or whether it also relates to depressed subjects' approach to tasks outside the laboratory. It would appear, though, that this approach would make subjects generally less sensitive to variations in the degree of contingency present in particular situations.

It may be recalled that there was also a marginally significant group X sex X order interaction on the measure relating to subjects' recall of the number of positive efforts that they made on the tasks, indicating that there were no group differences evident among the Order 1/males. It is unclear what the significance of this finding might be.

Other Findings Relating to the Contingency Perception Process

The main effects for task on the contingency perception measures provide information as to how reinforcement frequency influences the contingency perception process. Overall, the results indicate that subjects perceived relatively little contingency when faced with the high frequency negative feedback of Task C, but that they perceived moderate amounts of contingency when faced with the high frequency positive feedback of Task B, or the more neutral feedback of Task A. These findings suggest that subjects may be much more able to detect noncontingent relationships when they concern negative outcomes than when they concern positive outcomes. Similarly, they suggest that subjects may be prone to misperceive noncontingent positive feedback as being contingent, and to misperceive contingent negative feedback as being noncontingent. These findings are generally in agreement with those reported by Jenkins and Ward (1965): They indicate that subjects are broadly biased toward the perception of contingent relationships under positive conditions, and away from this perception under negative conditions. However, the primary findings of the current research indicate that this pattern is evidenced by both depressed and nondepressed subjects.

One significant sex effect was obtained on the contingency perception measures. On the negative feedback per-

cent measure, females were found to classify more negative outcomes as noncontingent events than did males—particularly when high amounts of negative feedback were received. This finding suggests that females may be more prone to employ self-protective biases in their perceptions of contingency than are males when faced with high frequency negative feedback. This finding is somewhat surprising since such a self-protective bias might be more expected in the generally less depression-prone males. It may be, however, that this finding simply reflects the tendency of females to recall more negative outcomes than did males (to be discussed below).

Other Findings on the Performance-Related Measures

The current research also yielded several other significant findings on the performance-related measures which may be briefly discussed. First, two additional sex effects were obtained on these measures. On the ability measure, males tended to give higher estimates of their ability than did females. Similarly, males were found to recall more positive outcomes than did females, particularly on Tasks A and C. Both of these findings indicate that males maintain more positive views of their performance than do females. The finding that females' recall estimates were more accurate than males', suggests that the differences in males' and females' evaluations

may reflect a self-serving over-estimation by males, rather than an underestimation by females.

Finally, significant task main effects were obtained on the ability, control, and recall measures, indicating that these variables are highly related to reinforcement frequencies. This is an entirely obvious finding for the recall measure, where the significant differences in subjects' estimates for all three tasks simply indicates that they were able to differentiate, quite accurately, the amount of positive versus negative feedback that they received on each of the three tasks. The finding for the ability measure is also not surprising, indicating only that subjects gave the lowest ability estimates on the task where they received the most negative feedback. The finding for the control measure, indicating differing degrees of control on each of the three tasks, and paralleling the frequency of reinforcement in each task, was of interest because it reinforced the argument, made earlier, that subjects' judgements of control are highly related to reinforcement frequency.

Concluding Comments and Suggestions for Future Research

The current research effort appears to have been successful in developing a procedure for more adequately assessing subjects' contingency perception tendencies. This was accomplished through specific procedural alterations

directed at the correction of two major difficulties noted in the prior research in this area: (1) that they had focused upon only a limited aspect of the contingency perception process, and (2) that they had confounded the concepts of contingency and control in their methodologies. The effectiveness of these procedural changes points out the necessity of researchers' being precise in their use of concepts and terminology, and the importance of having conceptual models of the phenomenon one is investigating (since a model such as that set forth by Crocker, 1981, may have made it clearer to researchers that they were examining only a limited aspect of the contingency perception process). In this regard, it may be recalled that parallels were drawn between the current findings and findings relating to the attribution of causality: This suggests that researchers need to carefully consider the similarities and differences involved in the perception of contingency and the attribution of causality processes (Miller, Note 2, has made a preliminary effort to distinguish these two processes). Further research is also needed in order to more clearly identify the various stages of the perception of contingency process and to further clarify the relationship between subjects' contingency perception tendencies and their tendencies to assume that they will be able to identify appropriate controlling responses.

The current research also appears to have been effective in demonstrating that mildly depressed subjects exhibit a heightened tendency to perceive contingency between their responses and subsequent outcomes, relative to nondepressed subjects. Further research is needed in order to replicate this finding in a clinical population, and to determine if this finding would also be found under conditions where depressed and nondepressed subjects make equal number of positive efforts while receiving high-frequency positive feedback. In this regard, further research may also examine the observed differences in depressed and nondepressed subjects' approaches to contingency perception tasks, in order to determine if this pattern is evident outside the laboratory, and, if so, what its consequences are for subjects' perceptions of events. The finding that depressed subjects evidence a heightened contingency perception tendency may be seen to have particular significance for how they might react to negative outcomes: Such a tendency would seem to result in lowered feelings of self-efficacy and self-esteem under negative conditions, as the person tends to view these negative events as stemming from his own actions. Thus, it may be therapeutically useful to help depressed subjects recognize that certain outcomes are independent of their responding. Clearly, however, more research is needed to clarify the causes and consequences of depressed subjects' heightened contingency perception tendencies.

APPENDIX A
SUBJECTS' INSTRUCTIONS FOR THE PERCEPTION OF CONTINGENCY TASK

The task that you will be involved with here involves word associations. I will show you a series of slides like this (experimenter shows sample slide). Each slide has a stimulus word at the top and two associates to that word below it. In this case, the stimulus word is "needle" and the two associates are "pin" and "thread". The stimulus words that you will be seeing have been shown to about 1500 other college students across the country, with the instructions that they are to give the word that they most strongly associate with the stimulus word. In this task, one of the two alternatives on each slide will be the word that most of the 1500 felt was most strongly associated with the stimulus word. For the example here, the most popular associate to the stimulus word "needle" was the response "thread". One part of your task here will require that you decide which of the two words on the slide is the most popular associate to the stimulus word. Any questions so far?

You will indicate your choice on each trial by pressing one of the two numbered buttons on your control panel

here. The device is designed to give you several different types of feedback regarding your performance on the word association task. It can be set in an "accurate feedback mode", like this, so that if you press the correct button--two in this case, since "thread" was the most popular response--a bell will sound to indicate that you made the correct response (the experimenter demonstrates). If you were to press the other button, this buzzer would sound to indicate that you had made the incorrect response (the experimenter demonstrates). Similarly, if number "1" had been the correct response, the device would have been set like this, and pressing #1 would have caused the bell to sound while pressing #2 would have caused the buzzer to sound (the experimenter demonstrates). So when the device is set in the accurate feedback mode, the bell will always ring when you give the correct, or most popular, response, and the buzzer will always sound when you give the incorrect, or less popular, response. Any questions?

There are two other types of feedback that this device can give you. When it is set in the "positive feedback mode", like this, the bell will sound regardless of which button you press (the experimenter demonstrates). So, when the device is set in the positive feedback mode, you will hear the bell regardless of whether your response is correct or not. Finally, the device can also be set in a "negative feedback mode", like this, so that the buzzer

will sound regardless of which button you press (the experimenter demonstrates). So when the device is set in the negative feedback mode, you will hear the buzzer regardless of whether your response is correct or not. Any questions?

On any given trial, the device may be set in any one of the three feedback modes. Your primary task in this experiment is to discover how related the sounding of the bell and buzzer are to the accuracy of your word association responses. In order to do this, you will need to consider the feedback you receive on each trial and come to some judgement as to what feedback mode the device is set in. If you hear the bell following a response, there are two possibilities: (1) the device is set in the accurate feedback mode, and you actually gave the correct word association response, or (2) the device is set in the positive feedback mode, and you would have heard the bell regardless of which button you pressed. Similarly, if you hear the buzzer following a response, there are two possibilities: (1) the device is set in the accurate feedback mode, and you actually gave the incorrect word association response, or (2) the device is set in the negative feedback mode, and you would have heard the buzzer regardless of which button you pressed.

One thing that may help you to make these judgements is to not necessarily always try to give what you think is

the correct answer: You may sometimes want to deliberately give what you think is the wrong answer, since it is as important to know how accurate the feedback is when you give a wrong answer as it is to know how accurate it is when you give a right answer. Each of the tasks you complete will consist of 32 trials. Please be sure to press only one button each trial. You will be asked some questions at the end of the task about how accurate you felt the feedback that you received was. Do you have any questions before we begin the task?

APPENDIX B
STIMULUS WORDS, EQUAL PROBABILITY ASSOCIATES, AND NONCONTINGENT FEEDBACK SCHEDULES EMPLOYED IN THE PERCEPTION OF CONTINGENCY TASKS

TASK A

	Stimulus Word	Equal Probability Associates		Noncontingent Outcome
		1	2	
1.	Dumb	Stupid	Smart	Bell
2.	Wish	Want	Dream	Buzzer
3.	Appear	Disappear	See	Bell
4.	Foot	Shoe(s)	Leg	Buzzer
5.	Playing	Fun	Working	Bell
6.	Box	Square	Cardboard Carton	Buzzer
7.	Quick	Slow	Fast	Buzzer
8.	Bite	Teeth	Chew	Bell
9.	Lettuce	Cabbage	Salad	Buzzer
10.	Friend	Foe	Enemy	Bell
11.	Noise	Loud	Sound(s)	Buzzer
12.	Blue	Sky	Red	Bell
13.	Running	Fast	Walking	Bell
14.	Sheep	Lamb	Wool	Buzzer
15.	Ice	Cold	Cube	Buzzer

TASK A				
	Stimulus Word	Equal Probability Associates		Noncontingent Outcome
		1	2	
16.	Child	Baby	Kid	Bell
17.	Ground	Earth	Dirt	Buzzer
18.	U.S.	America	Country	Bell
19.	Dark	Night	Black	Buzzer
20.	Hand	Finger(s)	Foot/Feet	Bell
21.	Is	Isn't	Are	Bell
22.	Because	Why	Of	Buzzer
23.	Street	Road	Car	Bell
24.	Mutton	Lamb	Sheep	Buzzer
25.	Hair	Head	Cut	Bell
26.	Chair	Sit	Table	Bell
27.	Breast	Nipple	Woman	Buzzer
28.	Closer	Farther	Nearer	Buzzer
29.	Cube	Square	Ice	Bell
30.	Brave	Coward	Hero	Buzzer
31.	Ocean	Sea	Water	Bell
32.	Bright	Light(s)	Dim	Buzzer

TASK B

	Stimulus Word	Equal Probability Associates 1	Equal Probability Associates 2	Noncontingent Outcome
1.	Smooth	Rough	Soft	Bell
2.	Ruler	King	Measure	Buzzer
3.	Moth	Ball(s)	Insect	Bell
4.	Beef	Meat	Cow	Bell
5.	Vegetable	Food	Carrot(s)	Bell
6.	River	Stream	Water	Buzzer
7.	Bible	Book	God	Bell
8.	Cracker	Crumb(s)	Food	Bell
9.	Swift	Slow	Fast	Buzzer
10.	Soldier	Army	Man	Bell
11.	Cake	Food	Pie	Bell
12.	Cloth	Clothes	Shirt	Bell
13.	Color	Blue	Red	Bell
14.	Sea	Water	Ocean	Bell
15.	Race	Run	Horse	Buzzer
16.	Mountain	High	Hill(s)	Bell
17.	Kid	Goat	Child(ren)	Bell
18.	Priest	Catholic	Church	Bell
19.	Stop	Go	Start	Bell
20.	Bath	Clean	Water	Buzzer
21.	Fear	Scared	Brave	Bell
22.	Religion	Church	God	Bell

TASK B

Stimulus Word	Equal Probability Associates 1	2	Noncontingent Outcome
23. Baby	Child(ren)	Boy	Buzzer
24. Meat	Steak	Eat	Bell
25. Hope	Wish	Faith	Bell
26. Sit	Stand	Down	Bell
27. Silk	Cloth	Stocking	Buzzer
28. Why	Because	Not	Bell
29. Laugh	Cry	Happy/Fun	Buzzer
30. Citizen	American	Person	Bell
31. Farm	Land	Country	Bell
32. Scared	Afraid	Frightened	Bell

TASK C

Stimulus Word	Equal Probability Associates 1	2	Noncontingent Outcome
1. Thought	Think	Idea	Bell
2. Short	Tall	Long	Buzzer
3. Sound	Noise	Hear	Buzzer
4. Carry	On	Hold	Buzzer
5. Deep	Dark	Shallow	Bell
6. Far	Near	Away	Buzzer
7. Music	Song	Sound	Buzzer
8. Milk	Cow(s)	Drink	Buzzer

TASK C

	Stimulus Word	Equal Probability Associates 1	Equal Probability Associates 2	Noncontingent Outcome
9.	Carpet	Rug	Soft	Bell
10.	Beautiful	Girl	Ugly	Buzzer
11.	Dirt	Clean	Mud	Buzzer
12.	Yellow	Green	Black	Buzzer
13.	Head	Ache	Hair	Buzzer
14.	Have	Had	Not	Bell
15.	Water	Drink	Swim	Buzzer
16.	Quietly	Loudly	Softly	Buzzer
17.	Cabbage	Food	Lettuce	Buzzer
18.	Soap	Water	Wash	Bell
19.	Train	Track(s)	Car(s)	Buzzer
20.	Find	Lose	Lost	Buzzer
21.	Rock	Hard	Stone	Buzzer
22.	Stomach	Ache	Food	Buzzer
23.	Whistle	Trail	Blow	Bell
24.	Take	Give	It	Buzzer
25.	Knife	Cut	Sharp	Buzzer
26.	Stream	River	Fish	Buzzer
27.	Cheese	Cake	Milk	Bell
28.	Memory	Mind	Think	Buzzer
29.	Bud	Rose	Flower	Buzzer
30.	Lady	Woman(en)	Man	Bell
31.	Red	White	Blue	Buzzer
32.	Cut	Blood	Wound	Buzzer

APPENDIX C
FULL VERSIONS OF THE QUESTIONS COMPRISING THE FOLLOW-UP QUESTIONNAIRE

1. This question relates to your judgements regarding the manner in which the device was set during the last task. As you know, the device could be set in either of three ways: in an accurate feedback mode, in a positive feedback mode, or in a negative feedback mode. On what percentage of the trials do you think the device was set in each of three modes? (Please make sure that your estimates total approximately to 100%.)

   A. In what percentage of the trials do you think the device was set in the accurate feedback mode--i.e., so that the bell would ring if you gave the correct response and the buzzer would sound if you gave the incorrect response?

   B. In what percentage of the trials do you think the device was set in the positive feedback mode--i.e., so that the bell would sound regardless of which response you made?

   C. In what percentage of the trials do you think the device was set in the negative feedback mode--i.e., so

that the buzzer would sound regardless of which response you gave?

2. The two parts of this question relate to the degree to which you felt the sounding of the bell corresponded to the accuracy of your responses on the last task. (Your answers to the two parts of this question do not have to total to 100%.)

A. If you had given the correct response on each of the trials of the task, on what percentage of the trials do you think the bell would have sounded?

B. If you had given the incorrect response on each of the trials of the task, on what percentage of the trials do you think the bell would have sounded?

3. This question relates to your overall judgement regarding the degree to which the sounding of the bell and buzzer corresponded to the accuracy of your responses on the last task. There would be a 100% correspondence between the sounding of the bell and buzzer and the accuracy of your responses if the bell sounded only for correct answers and the buzzer sounded only for incorrect answers. The degree of correspondence would diminish to the extent that the bell began to also sound for incorrect answers and/or the buzzer began to also sound for correct answers. The degree of correspondence would be 0% if the bell rang

equally often for correct and incorrect responses and if the buzzer sounded equally often for correct and incorrect responses. So, to what extent do you think that the sounding of the bell and buzzer corresponded to the accuracy of your responses in the last task?

4. This question relates to your judgement of your ability to choose the most popular word association response. If the device were set to give you totally accurate feedback --i.e., to really tell you the truth about how you were doing on the task--how many of the word association items do you think you would get correct?

5. This question relates to the degree of control you felt you had over the sounding of the bell and buzzer during the last task. You would have 100% control if you could make the bell and buzzer sound in accordance with your intentions or plans on 100% of the trials. Your degree of control would diminish to the extent that the buzzer began to sound on some of the trials on which you tried to make the bell sound and/or the bell began to sound on some of the trials on which you attempted to make the buzzer sound. You would have 0% control if the bell and buzzer sounded equally often when you tried to make the bell sound and if the bell and buzzer sounded equally

often when you tried to make the buzzer sound. Overall, how much control do you think you had over the sounding of the bell and buzzer in the last task?

6. The two parts of this question relate to your recall of the number of bells and buzzers you heard during the last task. (Your answers to the two parts of this question should total 32.)

A. How many times did you hear the bell?

B. How many times did you hear the buzzer?

7. The two parts of this question relate to your recall of the number of times during the last task that you attempted to give either correct or incorrect answers on the word association task. (Your answers to the two parts of this question should total 32.)

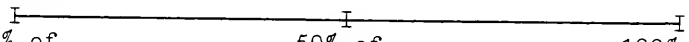
A. How many times did you try to give the correct answer?

B. How many times did you try to give the incorrect answer?

APPENDIX D
SUBJECTS' ANSWER SHEET FOR THE
FOLLOW-UP QUESTIONNAIRE

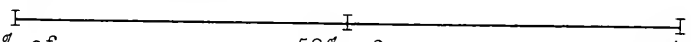
1. PERCENTAGE OF TRIALS IN EACH FEEDBACK MODE
(Please make sure that your answers to the three parts of this question total approximately to 100%.)

A. ACCURATE FEEDBACK MODE (Bell if correct/Buzzer if incorrect)



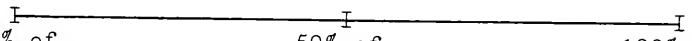
0% of the trials | 50% of the trials | 100% of the trials

B. POSITIVE FEEDBACK MODE (Bell if correct or incorrect)



0% of the trials | 50% of the trials | 100% of the trials

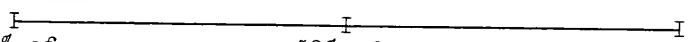
C. NEGATIVE FEEDBACK MODE (Buzzer if correct or incorrect)



0% of the trials | 50% of the trials | 100% of the trials

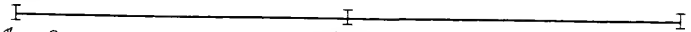
2. DEGREE OF CORRESPONDENCE BETWEEN SOUNDING OF BELL AND ACCURACY OF RESPONSES (Your answers to the two parts of this question do not have to total to 100%.)

A. PERCENTAGE OF TRIALS BELL SOUNDS IF CORRECT RESPONSE IS GIVEN



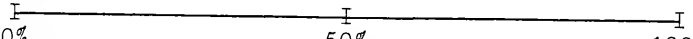
0% of the trials | 50% of the trials | 100% of the trials

B. PERCENTAGE OF TRIALS BELL SOUNDS IF INCORRECT RESPONSE IS GIVEN



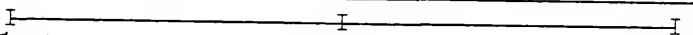
0% of the trials | 50% of the trials | 100% of the trials

3. OVERALL DEGREE OF CORRESPONDENCE BETWEEN THE SOUNDING OF THE BELL AND THE BUZZER AND THE ACCURACY OF YOUR RESPONSES



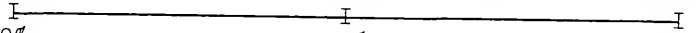
0% correspondence | 50% correspondence | 100% correspondence

4. ABILITY TO CHOOSE MOST POPULAR WORD ASSOCIATION RESPONSE



0% of the items correct | 50% of the items correct | 100% of the items correct

5. DEGREE OF CONTROL OVER SOUNDING OF BELL AND BUZZER



0% control | 50% control | 100% control

6. RECALL OF BELLS AND BUZZERS

A. Number of bells _____

B. Number of buzzers _____

7. RECALL OF CORRECT AND INCORRECT ATTEMPTS

A. Number of correct attempts _____

B. Number of incorrect attempts _____

APPENDIX E
COMPLETE RESULTS OBTAINED FROM THE REPEATED MEASURES ANALYSES OF VARIANCE FOR ALL DEPENDENT MEASURES

Table E-1. Complete results obtained from the repeated measures analysis of variance for subjects' transformed accurate feedback percent estimates.

Source	df	MS	F	p
Group (G)	1	4821.312	8.30	.005
Sex (S)	1	2171.772	3.74	.057
G X S	1	1834.736	3.16	.080
Order (O)	1	20.018	0.03	.853
G X O	1	614.572	1.06	.307
S X O	1	1041.634	1.79	.185
G X S X O	1	135.028	0.23	.631
$Error_b$	72	580.895		
Task (T)	2	11163.075	36.53	.001
G X T	2	96.223	0.31	.730
S X T	2	720.220	2.36	.098
O X T	2	455.869	1.49	.228
G X S X T	2	186.040	0.61	.545
G X O X T	2	18.411	0.06	.943
S X O X T	2	44.472	0.15	.865
G X S X O X T	2	69.511	0.23	.797
$Error_w$	144	305.598		

Table E-2. Complete results obtained from the repeated measures analysis of variance for subjects' transformed positive feedback percent estimates.

Source	df	MS	F	p
Group (G)	1	1238.956	4.71	.033
Sex (S)	1	117.980	0.45	.505
G X S	1	291.307	1.11	.296
Order (O)	1	194.941	0.74	.392
G X O	1	3.352	0.01	.910
S X O	1	723.419	2.25	.101
G X S X O	1	77.410	0.29	.589
$Error_b$	72	262.816		
Task (T)	2	11884.293	44.41	.001
G X T	2	180.478	0.67	.511
S X T	2	9.473	0.04	.965
O X T	2	305.994	1.14	.322
G X S X T	2	36.639	0.14	.872
G X O X T	2	243.022	0.91	.404
S X O X T	2	159.840	0.60	.552
G X S X O X T	2	90.018	0.34	.715
$Error_w$	144	267.611		

Table E-3. Complete results obtained from the repeated measures analysis of variance for subjects' transformed negative feedback percent estimates.

Source	df	MS	F	p
Group (G)	1	1172.162	4.61	.035
Sex (S)	1	1277.379	5.02	.028
G X S	1	663.892	2.61	.111
Order (O)	1	90.023	0.35	.554
G X O	1	527.147	2.07	.154
S X O	1	28.932	0.11	.737
G X S X O	1	7.963	0.03	.860
$Error_b$	72	254.295		
Task (T)	2	36085.871	202.03	.001
G X T	2	334.330	1.87	.158
S X T	2	713.623	4.00	.021
O X T	2	216.975	1.21	.300
G X S X T	2	383.685	2.15	.120
G X O X T	2	255.740	1.43	.239
S X O X T	2	80.071	0.45	.640
G X S X O X T	2	52.699	0.30	.745
$Error_w$	144	178.620		

Table E-4. Complete results obtained from the repeated measures analysis of variance for subjects' estimates of the probability that the bell would occur given a correct response.

Source	df	MS	F	p
Group (G)	1	2620.204	7.22	.009
Sex (S)	1	537.004	1.48	.228
G X S	1	781.204	2.15	.147
Order (O)	1	17.604	0.05	.826
G X O	1	171.704	0.47	.494
S X O	1	297.038	0.82	.369
G X S X O	1	24.704	0.07	.795
$Error_b$	72	362.988		
Task (T)	2	33179.429	145.74	.001
G X T	2	233.079	1.02	.362
S X T	2	476.554	2.09	.127
O X T	2	45.429	0.20	.819
G X S X T	2	70.454	0.31	.734
G X O X T	2	509.779	2.24	.107
S X O X T	2	204.838	0.90	.409
G X S X O X T	2	259.204	1.14	.323
$Error_w$	144	227.661		

Table E-5. Complete results obtained from the repeated measures analysis of variance for subjects' estimates of the probability that the bell would occur given an incorrect response.

Source	df	MS	F	p
Group (G)	1	238.004	0.51	.476
Sex (S)	1	738.504	1.59	.211
G X S	1	121.838	0.26	.610
Order (O)	1	4637.604	10.01	.002
G X O	1	1722.704	3.72	.058
S X O	1	246.038	0.53	.468
G X S X O	1	87.604	0.19	.665
$Error_b$	72	463.071		
Task (T)	2	2161.529	4.61	.012
G X T	2	119.154	0.25	.776
S X T	2	790.679	1.69	.189
O X T	2	796.579	1.70	.187
G X S X T	2	199.388	0.42	.655
G X O X T	2	520.204	1.11	.328
S X O X T	2	44.713	0.10	.909
G X S X O X T	2	13.554	0.03	.972
$Error_w$	144	469.197		

Table E-6. Complete results obtained from the repeated measures analysis of variance for the difference between subject' estimates of the probability that the bell would occur given the presence versus the absence of a correct response.

Source	df	MS	F	p
Group (G)	1	912.600	1.80	.184
Sex (S)	1	1297.350	2.56	.114
G X S	1	248.067	0.49	.486
Order (O)	1	43.350	0.09	.771
G X O	1	299.267	0.59	.444
S X O	1	1206.017	2.38	.127
G X S X O	1	160.067	0.32	.576
$Error_b$	72	505.905		
Task (T)	2	2775.204	6.68	.002
G X T	2	336.863	0.81	.446
S X T	2	777.763	1.87	.157
O X T	2	1186.088	2.86	.061
G X S X T	2	247.204	0.60	.553
G X O X T	2	59.029	0.14	.872
S X O X T	2	270.579	0.65	.523
G X S X O X T	2	10.904	0.03	.974
$Error_w$	144	415.223		

Table E-7. Complete results of the repeated measures analysis of variance for subjects' global contingency ratings.

Source	df	MS	F	p
Group (G)	1	717.604	1.84	.179
Sex (S)	1	1148.438	2.94	.091
G X S	1	124.704	0.32	.574
Order (O)	1	288.204	0.74	.393
G X O	1	1029.204	2.64	.109
S X O	1	139.538	0.36	.552
G X S X O	1	78.204	0.20	.656
$Error_b$	72	390.341		
Task(T)	2	14446.017	30.90	.001
G X T	2	244.217	0.86	.425
S X T	2	373.400	1.32	.272
O X T	2	162.767	0.57	.565
G X S X T	2	191.267	0.67	.511
G X O X T	2	387.917	1.37	.257
S X O X T	2	540.200	1.90	.153
G X S X O X T	2	274.067	0.97	.383
$Error_w$	144	283.820		

Table E-8. Complete results obtained from the repeated measures analysis of variance for subject's ability estimates.

Source	df	MS	F	p
Group (G)	1	1157.204	3.16	.080
Sex (S)	1	1943.704	5.31	.024
G X S	1	19.838	0.05	.817
Order (O)	1	262.504	0.72	.400
G X O	1	832.538	2.27	.136
S X O	1	7.704	0.02	.885
G X S X O	1	19.838	0.05	.817
$Error_b$	72	365.998		
Task (T)	2	1421.204	8.56	.001
G X T	2	231.404	1.39	.252
S X T	2	317.379	1.91	.152
O X T	2	111.829	0.67	.512
G X S X T	2	222.163	1.34	.266
G X O X T	2	5.113	0.03	.972
S X O X T	2	89.754	0.54	.584
G X S X O X T	2	137.788	0.83	.438
$Error_w$	144	166.042		

Table E-9. Complete results obtained from the repeated measures analysis of variance for subjects' control estimates.

Source	df	MS	F	p
Group (G)	1	248.067	0.31	.578
Sex (S)	1	437.400	0.55	.461
G X S	1	1793.067	2.25	.138
Order (O)	1	48.600	0.06	.806
G X O	1	166.667	0.21	.649
S X O	1	2829.067	3.56	.063
G X S X O	1	0.600	0.00	.978
$Error_b$	72	795.291		
Task (T)	2	8241.304	23.21	.001
G X T	2	216.329	0.61	.545
S X T	2	630.538	1.78	.173
O X T	2	144.163	0.41	.667
G X S X T	2	227.079	0.64	.529
G X O X T	2	135.404	0.38	.688
S X O X T	2	330.079	0.93	.397
G X S X O X T	2	179.638	0.51	.604
$Error_w$	144	355.071		

Table E-10. Complete results obtained from the repeated measures analysis of variance for subjects' recall of positive outcomes.

Source	df	MS	F	p
Group (G)	1	5.013	0.45	.503
Sex (S)	1	55.035	4.98	.029
G X S	1	17.558	1.59	.212
Order (O)	1	9.232	0.83	.364
G X O	1	27.395	2.48	.120
S X O	1	1.756	0.16	.692
G X S X O	1	0.533	0.05	.827
$Error_b$	72	11.060		
Task (T)	2	4054.489	405.00	.001
G X T	2	3.842	0.38	.682
S X T	2	27.313	2.73	.069
O X T	2	13.787	1.38	.256
G X S X T	2	9.749	0.97	.380
G X O X T	2	35.680	3.56	.030
S X O X T	2	5.355	0.53	.587
G X S X O X T	2	20.396	2.04	.134
$Error_w$	144	10.011		

Table E-11. Complete results obtained from the repeated measures analysis of variance for subjects' recalled number of correct attempts.

Source	df	MS	F	p
Group (G)	1	423.473	8.63	.004
Sex (S)	1	2.846	0.06	.810
G X S	1	133.296	2.72	.104
Order (O)	1	7.052	0.14	.706
G X O	1	25.437	0.52	.474
S X O	1	66.993	1.37	.247
G X S X O	1	190.687	3.89	.053
$Error_b$	72	49.072		
Task (T)	2	20.298	0.88	.418
G X T	2	104.595	4.53	.012
S X T	2	36.591	1.58	.209
O X T	2	13.590	0.59	.557
G X S X T	2	4.744	0.21	.815
G X O X T	2	60.966	2.64	.075
S X O X T	2	18.515	0.80	.451
G X S X O X T	2	1.164	0.05	.951
$Error_w$	144	23.103		

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Ricky Earl Miller was born on November 12, 1954, in Meridian, Mississippi. He graduated with high honors from Meridian High School, in 1972, and from Meridian Junior College, in 1974. He then attended the University of Southern Mississippi, where he received the Bachelor of Arts degree in psychology, in 1976, graduating with highest honors. He was admitted to the graduate program in clinical psychology at the University of Florida in the fall of 1976, where he has remained up to the present time. He received the Master of Arts degree in clinical psychology, in December of 1979, and he has completed a one-year clinical psychology internship at the Milwaukee County Mental Health Complex, in Milwaukee, Wisconsin.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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